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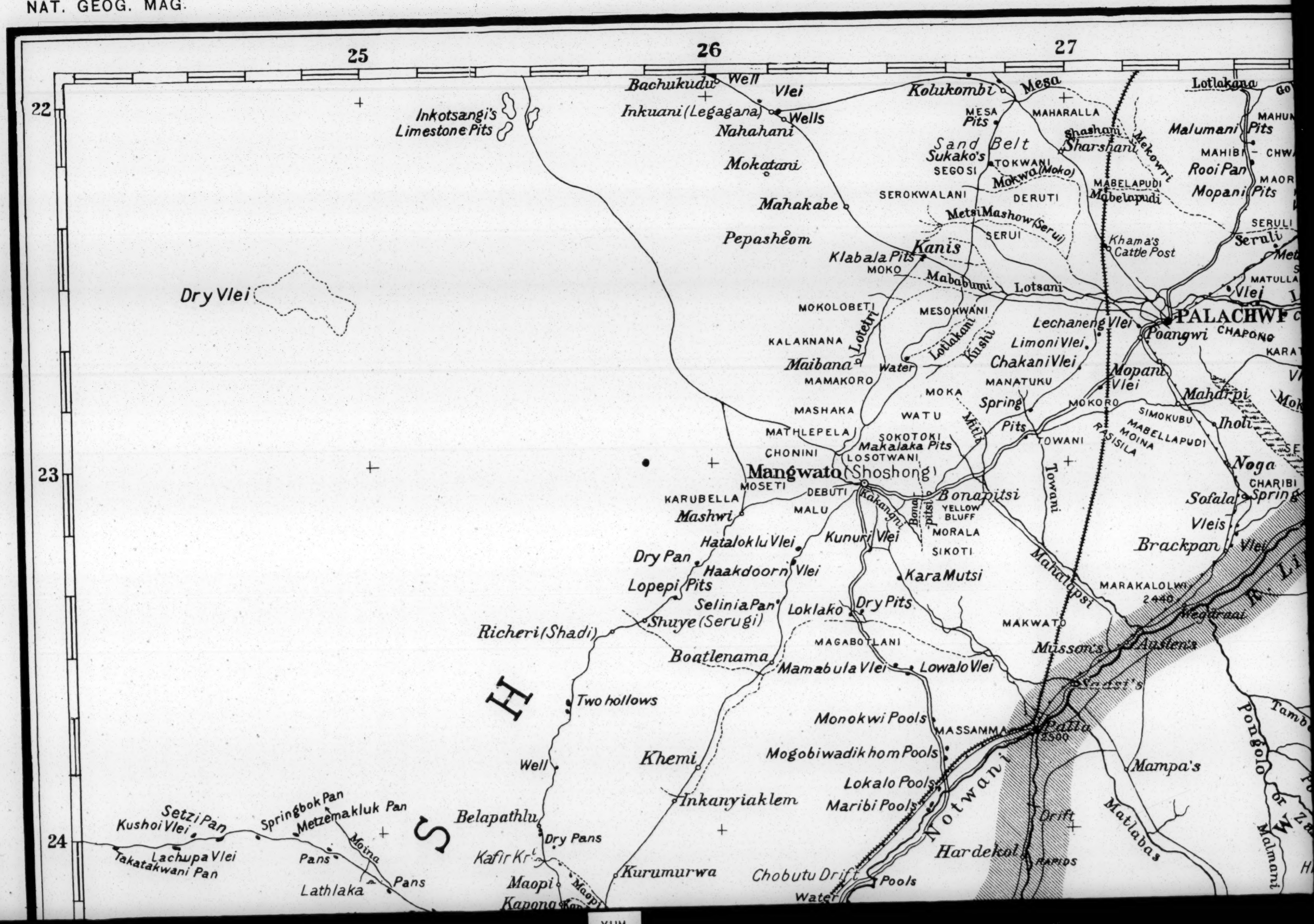
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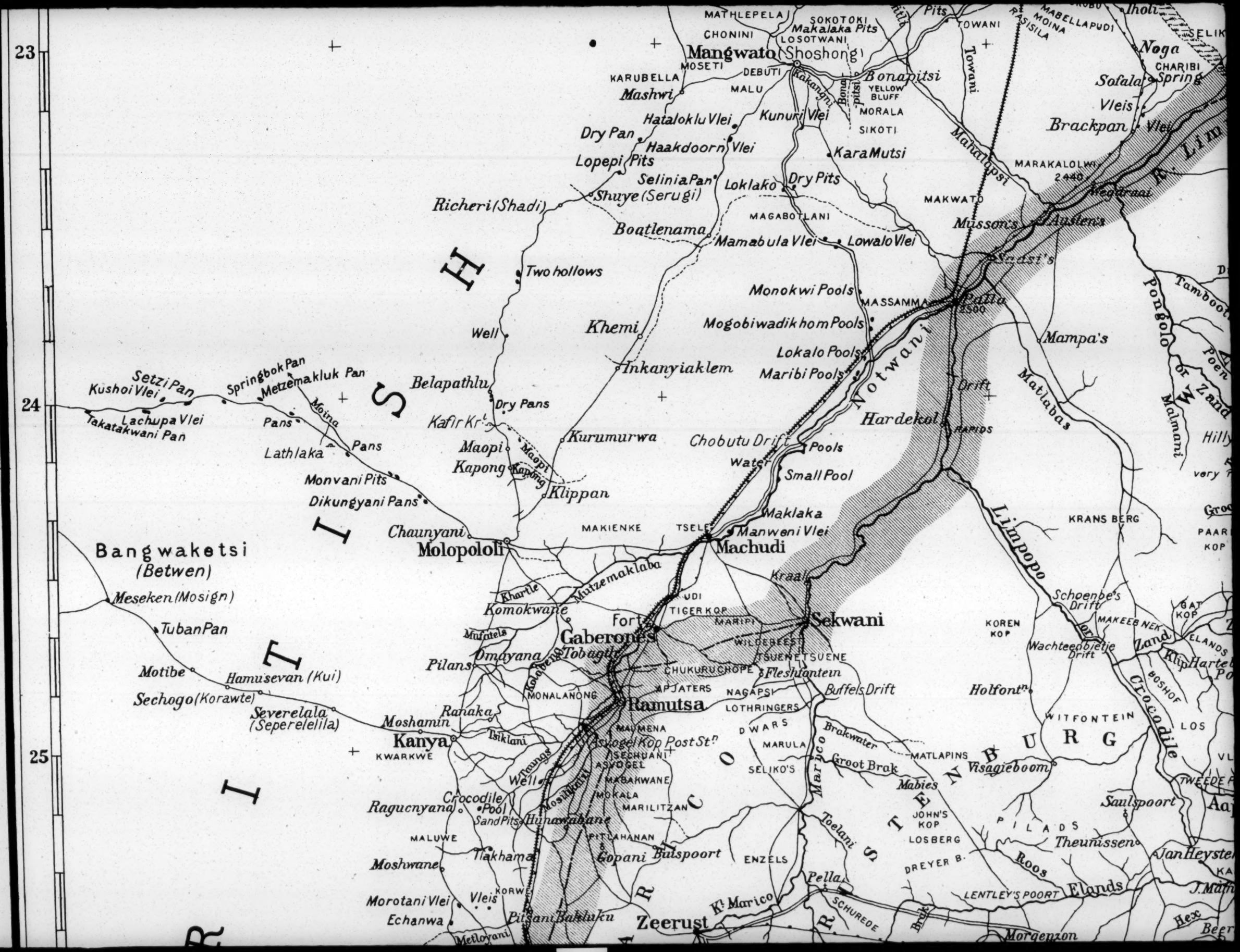

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Maklaka
Manweni Vlei
Machudi
Kraal
Towani
Mahalapsi
Pits
TOWANI
SIMOKUBU
MABELLAPUDI
MOINA
RASISILA
Thoti
Vlei
Noga
CHARIBI
SELIKA
Spring
Sofala Vleis
Brackpan Vlei
R. Limpopo
MARAKALOLWI 2440
Wegdraai
Duiker
Tambootie
Pongolo or Zand
Malmani
Mampa's
Matlabas
Poen Lyn Loop
Hilly Country
very rugged
Zwai Vasch
Groot Sterkstroom
Klein
PAARDE KOP
KRANS BERG
Limpopo
Schoenbe's Drift
KOREN KOP
MAKEEB NEK
Wachteenbietje Drift
Holfontn
WITFONTEIN
Crocodile
Brakwater
MATLAPINS
Groot Brak
Visagieboom
Mabies
Saulspoort
Aapies
TWEEDE POORT
EERSTE POORT
VLEIG
LOS
VAALWATERS NEK
Hartebeest Poort
Witfontn
ROOI
Klip
ELANDS
Zand
GAT KOP
BOSHOT
Nylstroom
Kl Nyl
BADS
Natorp
Harting sburg
Boshof
Modimuli
KRANS KOP
Nyl
Engelbrecht
ZWACERS HOEK
Zand
METHEMACHANA
Tobias Zyn
Kalkput
Klipfontein
Sekwati
Paardeplaats
Commissie Drift
Verlust
Pan
BrinkFn
McCabe's Vlei
Hoogebomen
Mabaan
Neuhalte
A Mabaan
Alman's Drift
Springbok Vlakte
Plat
Saul
Jericho
Swampy
Makapan
Mosella
Sjambok
Jan Heystek
KAMEEL ZEINS
J. Matlachalie
Theunissen
Roos
Elands
Pella
LENTLEY'S POORT
SCHUREDE
Kl Marico
Toelani
Marico
ENZELS
JOHN'S KOP
LOSBERG
DREYER B.
PILADS
Fleshfontein
Buffels Drift
NAGAPSI
LOTHRINGERS
DWARS
MARULA
SELIKO'S
TSUENETSUENE
WILDEBEEST
MARIPI
Sekwani
KUKURUCHOPE
TSELE
UDI
IGER KOP
ATERS
isa
st Stn
oort
Zand River Mts
Sterk
Groot Sterkstroom
Klein
Mura Dr.
Pt Potgieter Rust
Mynhardt
HANGLIP
GEELHOUT
Dwars
Zand
Mapan
Smitsdorp
PIENAARS REK
STRYDPOORT BERG
Chuni
Mapashlela
Zebedele
Ft Olifant
LULU BERG
Roosto
Malipsi
Malip
Cobalt Mines
OLIFKOP
MALEO
MASEPE
Buffels
Bloed
Flands
Kameel
Kameel Poort
Leeuw
Moos
Kalk
Cobalt
Pietersburg
4270
Maraba
Marabastadt
Turf Fontn
Marais
Haenertsb
Wright
Legalie
Matala
Berricht
Malitz
Bloed
RHENOSTER POORT
Klipdam
3960
Vlakwater
Hout
Bethesda
KAMEEL K.
RIETA
K. ENKEL
LEEUW KOP
WITKLIP
Sepapani
Mapala
Kl Magalaqueen
Bampop's
Wildebeest (Gold R.)
DE PLATEN
Pongolo
Duiker
Tambootie
New Belgium
Poen Lyn Loop
Palala
Kl Palala
SPIOENKOP
Shimmelpad Pan
Madlala's Pan
Pan
Setonia
Sabella
Palala
KOEDO'S BERG
TAFEL KOP
Maraben
Napin
Mamedi
Kwedlinburg
ROODERAND
BLAAUW BERG
Zoutpan (New Town)
Salt Pans
Hofmeyer
MASJABA
Kalkfn
BANDELIER
Diepholte
Dwars
Davi
Matok
Ramag
Koper
Riet
Hout
Zoutpan
Limpopo
Limpopo
Limpopo
Limpopo

Zoutpan (New Town)
Salt Pans
Kwedlinburg
Mamedi
Mapin
ROODERAND
BLAAUW BERG
Pan
Madlala's Pan
Shimmelpad Pan
Maraben
WITKLIP
Hofmeyer
Dorps
DERDE BERGEN
TWEEDE BERGEN
ZOUTPANS BERG
MAGATE
4000 PISANG
Albasinie
SHEFUNKOL
Georgenholt
Mashenduti
Makoarela
4400 MANGUETI
Sakoma
MHINGA
SAMBILA
ZUNDO
Papanhani
GHIKUNDO
REBANGA
Shingwedzane
Mapikane
Liloni
Bungane
Kalesh
Limpopo
Kanani
LUVUVHU & LETABA
Pafuri or Lebubi
Makeli
SHIRINDI
GUZANE
Shingwedzi
Mushake
Madiakomwe
Shivanda
Madunji
Spelonken
Kt Letaba
LEVALLI
SHITANDA
SHIVULAAN
IZERBERG 3560
MATSENA
SHISHIMBI
Birthday
MOSINZI
MOSIPA
MACOR
PALAFALE
MAHILA
SUTHERLAND
Molototsi
NGOTSI
ISHALI
KALEKA
Shongolo
Ridsolo
Ngweuren
Groot Letaba
Sesuli
Nzhelele
Mahoxi
Waldezuil
MASJABA
Kalkfontein
BANDELIER
Diepholte
Slabbert
MARAIS
Davidson
Dwars
Matok
Ramagoep
Hoper
Skiet
Visrivier
Bethesda
RIETA
KAMEEL K.
LEEUW KOP
K.ENKEL
Hout
Sepapani
Nyl
Magalaqueen
Bampop's
Malitz
RHENOSTER POORT
Klipdam 3960
Matala
Berricht
Bloed
Legalie
Houtbush
Koodoes
Mosungulutzi
MAJOJI
Umshaka
2130 GOEKWE
Letaba
BLACK HILLS
Groot
Pietersburg
4270
Marais
Agatha
Haenertsburg
Wright
Maraba
Marabastadt
Turf Font
Makapan
Smitsdorp
Malipsi
Malipsi Berg
Leydsdorp
Selati
Olifants
MURCHISON
Mulati
SPITZKOP
TACHU
MACHO
MASHIMALA
DUIKER
HARRISH
DIUKE
Setuli
Babati
Thabina
Nodobitzi
KATSUADIRA
MAROLA
MAHOGAILO
MALEGAPI
Blyde
Riet
Maranken
Mastiman
Marule Flats
Marule
Mariti
Mariep
Mahaman
Zand
Mayarin
Magange
Mabonga
Masitondi
RAMKWA-SAMSATA (BUFFELS KOP)
Manyuki
Makaisu
Pala
Matasin
Noaritsi
Munkangari
Mahusan
Jonas
MATALI
SETLALI
SPABANANI
MUNJI
Sabi
Matervamba
Matermeri
LEBOMBO OR UBOMBO MTNS
Mahitoka
MAKUTSANIN
ENDU
UTUTU
LOZIES 5000
PRETORIUS
DEVILS
SPITZKOP
KNUCKLES
MOODIES
ANDERSON 7000
Pilgrims Rest
Badenhorst
Sabi Sand
MANUPI
Schoeman 7000
Hotel
Schrikkloof
Bokgat
Roosenkal
Mapoch
Mokwana
Gwangonda
LYDENBURG
8720
Spekboom
Steelpoort
Krugerspost
Ohrigstadt
Waterval
Dwars
BAKENKOP
MAGNET HEIGHT
Khalathutlu
Commissie Drift
Verlust
Doorn
Brink Fn
McCabe's Vlei
Hoogebomen
Mabaan
Neuhalle
Alman's Drift
Klipfontein
Eland's
Kameel
Kameel Poort
Leeuw
Saul
Pringbok Vlakte
Mapala
Nyl
Modimulli
KRANSKOP
Natorp
BADS BERG
Nyl
Tobias Zyn
Sterk
RIVER MTS
METHEMACHANA
HANGLIP
Mura Dr.
Pt Potgieter Rust
SPIOENKOP
Makapan
Mynhardt
PIENAARS NEK
Chuni
STRYDPOORT BERG
Mapashlela
Zebedele
Kalkput
Ft Olifant
Rostock
Waterkop
SAKUN
TOKANI
LULU BERG
Mosego
Geluk
Gebuk
Sekwati
Klipfontein
Paardeplaats
Pan
MASEPE
Bloed
Buffels
MALEO
OLIFKOP
Cobalt Mines
Moder
Kalk
Moos
Vaal
Mabaan
Alman's Drift
MALUK
Klipfontein
Eland's
Kameel
Leeuw
Saul
Pietersburg
Maraba
Marabastadt
Turf Font
Makapan
Smitsdorp
Haenertsburg
Leydsdorp
Lydenburg
Spelonken
Pietersburg
Waterval
Spekboom
Steelpoort
Krugerspost
Ohrigstadt
Dwars
Khalathutlu
Magnet Height
Bakenkop
Mokwana
Gwangonda
Roosenkal
Mapoch
Schrikkloof
Bokgat
Schoeman
Hotel
Knuckles
Moodies
Anderson
Pilgrims Rest
Badenhorst
Sabi Sand
Manupi
Spitzkop
Devils
Pretorius
Lozies
Endu
Ututu
Makutsanin
Mahitoka
Matervamba
Matermeri
Sabi
Munji
Matali
Setlali
Spabanani
Jonas
Mahusan
Munkangari
Noaritsi
Matasin
Makaisu
Mayarin
Magange
Babati
Manyuki
Ramkwa-Samsata
(Buffels Kop)
Maranken
Mastiman
Marule Flats
Marule
Mariti
Mariep
Mahaman
Zand
Mankele
Mazelema
Kobamsadi
Maritsi
Badenhorst
Mahusan
Munkangari
Jonas
Matali
Setlali
Spabanani
Sabi
Lebombo Mtns
Ubombo
Matsoo
Babati
Mabonga
Setuli
Tachu
Mucho
Harrish
Duiker
Mashimala
Olifants
Selati
Leydsdorp
Haenertsburg
Agatha
Houtbush
Legalie
Bloed
Pietersburg
Rhenoster Poort
Klipdam 3960
Malitz
Matala
Berricht
Maraba
Marabastadt
Turf Font
Makapan
Smitsdorp
Mynhardt
Chuni
Strydpoort Berg
Mapashlela
Zebedele
Kalkput
Ft Olifant
Rostock
Waterkop
Sakun
Tokani
Lulu Berg
Mosego
Geluk
Gebuk
Sekwati
Klipfontein
Paardeplaats
Pan
Commissie Drift
Verlust
Doorn
Brink Fn
McCabe's Vlei
Hoogebomen
Mabaan
Neuhalle
Alman's Drift
Klipfontein
Eland's
Kameel
Kameel Poort
Leeuw
Saul
Pringbok Vlakte
Mapala
Nyl
Modimulli
Kranskop
Natorp
Bads Berg
Tobias Zyn
Sterk
River Mts
Methemachana
Hanglip
Mura Dr.
Pt Potgieter Rust
Spioenkop
Makapan
Mynhardt
Pienaars Nek
Chuni
Strydpoort Berg
Mapashlela
Zebedele
Kalkput
Ft Olifant
Rostock
Waterkop
Sakun
Tokani
Lulu Berg
Mosego
Geluk
Gebuk
Sekwati
Klipfontein
Paardeplaats
Pan
Masebe
Bloed
Buffels
Maleo
Olifkop
Cobalt Mines
Moder
Kalk
Moos
Vaal
Mabaan
Alman's Drift
Maluk
Klipfontein
Eland's
Kameel
Leeuw
Saul
Pringbok Vlakte
Mapala
Nyl
Modimulli
Kranskop
Natorp
Bads Berg
Tobias Zyn
Sterk
River Mts
Methemachana
Hanglip
Mura Dr.
Pt Potgieter Rust
Spioenkop
Makapan
Mynhardt
Pienaars Nek
Chuni
Strydpoort Berg
Mapashlela
Zebedele
Kalkput
Ft Olifant
Rostock
Waterkop
Sakun
Tokani
Lulu Berg
Mosego
Geluk
Gebuk
Sekwati
Klipfontein
Paardeplaats
Pan
Commissie Drift
Verlust
Doorn
Brink Fn
McCabe's Vlei
Hoogebomen
Mabaan
Neuhalle
Alman's Drift
Klipfontein
Eland's
Kameel
Kameel Poort

PORTUGUESE

23

24

25

Limpopo

Lebombo Mts

Lebombo or Libombo

Mamkone

Liloni

Bungane

Kaleshe

Shahalati

Zumba-nyimbo

Kanani

Shitanguti (? Sanguti)

Mushakeni

Raloyos

Chimbazo

Madiakomwe

Shivandando

Shingwedzi

Madunji

Zatu

Masisidani

Umetaka

Mahozi

Nkunzi

Inguana

L. Monhembongo

Sangutani

Dumbane

Hlendefu

Massablano

Imbeitsi

Matsobane

Mbinduane

Mahasane

Nkaniane

Kamajuguana

Mafate and Mabuinguella

Nyametsi

Nuatsunzana

Mtanguana

Manjobo

Shiamahefe

Shengana

Shengana

Jambane

Boshene

Samemu

Kosen

Medalana

Bi-ene

Manjakazi

L. Sule

Tiniane

Inhukutzi

Mafussane

Nyamatonga

Ndlelen

Kossine

Manguane

Antioka

Melombe

Unfutine

L. Swale

Magudo

Magut

Kossine

Maringane

Umbango

Mjabi

Kabi

Shikongo

L. Soki

Shikutli

Chai-chai

Inhampura

Balo (Inhapalipali)

R. Limpopo

Shinavane

Makulenene

Stokolo

Intimane

Petane

Boi

Matikudane

Magwamba

Shongo

Manhisa

Mahlangene

Kakoana

Inhanapa

Nuanetsi

Mutirikwi

Sabi

Olifants

Lundi

Ngwenya

Groot Letaba

Letaba

Ndzelele

Shongolo

Ngotsi

Ishali

Kaleka

Mosinzi

Birthday

Shingwedzi

Shingwedzane

Shingwedzi

Guzane

Rebanga

Chikundo

Zundo

Mhinga

Sambila

Georgenholtz

Mashenduti

Makoarela

Jelele

Berg

Sakoma

Lebvubi

Paturi

Mahebi

Naldezui

Shefunkol

Shirindi

Shivulaan

Shitanda

Izerberg 3560

Matsena

Shishimbi

Macor

Palafale

Sutherland

Molototsi

Majoji

Umshaka

Black Hills

Groot

Murchison

Spitzkop

Mulati

Selati

Leydsdorp

Tachu

Mocho

Mashimala

Duiker

Harrish

Diuke

Setluli

Shaltine

Mashlepiti

Umtilasetsi

Babati

Mahogailo

Malecap

Blyde

Rret

Marankewan

Marule Flats

Marule

Mariti

Mastiman

Ramkwa-Samsata (Buffels Kop)

Manzuki

Matlolo

Magange

Mayarin

Mariep

Mahlamahale

Mahaman

Land

Kaspers Nek

Ohrigstadt

Spekboom

Watervals

Dwars

Krugerspost

Pilgrims Rest

Mankele

Mazeleman

Makaisu

Kobamshadi

Noaritsi

Maritsi

Munkungari

Mahusun

Badenhorst

Anderson 7000

Maugh 18720

Moodies

Schoeman 7000

Hotel

Devils

Spitzkop

Pretorius

Lozies 5000

Endu

Makutsanin

Ututu

Setlali

Matali

Spabanani

Guluman

Munji

Jonas

Matervamba

Matervueria

Manupi

Two Hollows
Well
Khemi
Monokwi Pools
MASSAMMA
Patta
2500
Mogobiwadikhom Pools
Lokalo Pools
Maribi Pools
Inkanyiaklem
Belapathlu
Dry Pans
Kafir Kr.
Kurumurwa
Maopi
Kapong
Maopi Kapong
Klippan
Chobutu Drift
Pools
Water
Small Pool
Hardekol
RAPIDS
Drift
Notwani
Mampa's
Matlabas
Pongolo or Malmani
Hilly
Setzi Pan
Kushoi Vlei
Springbok Pan
Metzemakluk Pan
Lachupa Vlei
Takatakwani Pan
Moina Pans
Pans
Lathlaka
Monvani Pits
Dikungyani Pans
Chaunyani
Molopololi
MAKIENKE
TSELE
Maklaka
Manweni Vlei
Machudi
Limpopo
KRANS BERG
Groot
PAARDE KOP
Bangwaketsi (Betwen)
Meseken (Mosign)
Tuban Pan
Mutzemaklaba
Khartle
Komokwane
UDI
TIGER KOP
Kraal
Schoenbe's Drift
Fort
Gaberones
MARIPI
Sekwani
KOREN KOP
GAT KOP
MAKEEB NEK
Mufatela
Omayana
Tobagtle
WILDEBEEST
TSUENETSUENE
Wachteenbietje Drift
Zand
Motibe
Hamusevan (Kui)
Pilans
CHUKURUCHOPE
Fleshfontein
Sechogo (Korawte)
MONALANONG
APJATERS
NAGAPSI
Buffels Drift
Holfontn
Severelala (Seperelelila)
Ramaka
Ramutsa
LOTHRINGERS
Moshamin
Kanya
KWARKWE
Tsiklani
MALMENA
Asvogel Kop Post Stn
ASECHUANI
ASVOGEL
MABAKWANE
MOKALA
MARILITZAN
DWARS
MARULA
SELIKO'S
Brakwater
Groot Brak
MATLAPINS
Visagieboom
Mabies
WITFONTEIN
Crocodile
Ragucnyana
Pool
Sand Pits
Hunawabane
PITLAHANAN
Saulspoort
JOHN'S KOP
LOSBERG
PILADS
Theunissen
Aapi
Jan Heystek
Toelani
Bulspoort
Gopani
ENZELS
DREYER B.
Roos
Elands
LENTLEY'S POORT
Pella
Morotani Vlei
Vleis
KORWE
Echanwa
Pitsani Bakluku
Zeerust
K. Marico
SCHUREDE
Morgenzon
Garon
RUSTENBURG
Kroonstad
Walwaters Kop
Hex
Metloyani
Water Pits
Ramathlabama
Lotlakana
Mabuli
Molopo
Makgari
Pitsani
Lapin (Ramathlabama)
Mogodisa
J. Massibi
Israel
Otto Shoop
ZWART RUGGENS
KLN TAFEL
Groenfontn
Buffels Hoek
Koesters Fn
Kukume?
Motlobolok
Kwedi
Sedilomoloma
Matlapin?
Kudankwe
Sante
MAFEKING
Rooigrond
Molopo
Shuba
Malaba
Potfontn
Madibi Siding
Kora
Madibi
DOORN
Doornpoort
WATERS
Thorndale
Koesters Fn
Grobler
Klopper
Ladik
LICHTENBURG
Erasmus
Dwarsfn
Bosman
Kruger
TAFEL
Rietpan
Vetpan
Grootbosch
Esterhuis
Holfontn
Brandvlei
Doornfontn
Coetzee
Steyman
Martin
Smit
HOUT
Retief
Meyburg
Mosita
Mabakwane
BOSON
Kraal Pan Siding
Molthakapitsi
Setlagolu
Marakwa
Maretsani Siding
Maretsani
Mosita
Madibon
Metsing
Kosita
Kora
Madibi
Tobagtle
Kolobeng
Mutsi
Crocodile
Pool
Sand Pits
Hunawabane
Ramathlabama
Pitsani
Lapin
Mogodisa
Molopo
Makgari
Mabuli
Lotlakana
Kukume?
Matlapin?
Kudankwe

Monokwi Pools
MASSAMMA
Pella 2500
Mogobiwadikhom Pools
Lokalo Pools
Maribi Pools
Notwani
Drift
Hardekol
RAPIDS
Chobutu Drift
Pools
Water
Small Pool
Maklaka
TSELE
Manweni Vlei
Machudi
Kraal
UDI
TIGER KOP
MARIPI
Sekwani
WILDEBEEST
TSUENETSUENE
CHUKURUCHOPE
Fleshfontein
PJATERS
NAGAPSI
Buffels Drift
LOTHRINGERS
DWARS
MARULA
Brakwater
Groot Brak
MATLAPINS
SELIKO'S
Mabies
Visagieboom
JOHN'S KOP
LOSBERG
DREYER B.
ENZELS
Toelani
Pella
SCHUREDE
Brak
LENTLEY'S POORT
Elands
Roos
Mampa's
Matlabas
Limpopo
KRANS BERG
Schoenbe's Drift
KOREN KOP
Wachteenbietje Drift
Holfontn
Saulspoort
Theunissen
PILADS
Pongolo or Malmani
Duiker
Tambootie
Poen Lyn Loop
New Belgium
Wildebeest (Gold R.)
DE PLATEN
Hilly Country
very rugged
Groot Sterkstroom
Klein
PAARDE KOP
Zandegs
Dwars
GEELHOUT
K^t Palala
Palala
SPIOENKOP
HANGLIP
Sterk
Mura Dr.
pt Potgieter Rust
Makapan
Mynhardt
PIENAARS NEK
Smitsdorp
Chuni
STRYDPOORT BERG
Mapashlela
Zebedele
Chuni
F^t Olifant
Kalkput
METHEMACHANA
ZAND RIVER Mts
Engelbrecht
ZWACERS HOEK
Tobias Zyn
Zand
Boshof
Modimuli
Nyl
HOEK
GAT KOP
Nylstroom
KRANS KOP
Klipfontein
Sekwati
Natorp
Pan
Poardeplaats
Commissie Drift
Verlust
Brink Fn
McCabe's Vlei
Hoogebomen
Mabaan
Neuhalle
Alman's Drift
MALUK
Bloed
MASEPE
Buffels
MALEO
OLIFKOP
Elands
Kameel
KAMEEL POORT
Kalk
Cobalt Mines
Rensburg
Potgieter
Vermaak
Klip
Groot RHENOSTER
MAKIBI
MIDDELBURG
Pan St.
Nieker k
K. Olifants
Wonderf
Elands R.
Bronkhorst Spruit
Rhenoster
Brug St.
Olifants
Balmoral
Irene
Erasmus
Hennops
PRETORIA
4456
Schoeman
Kloppers
Grobler
Mogalies
MAGALIES BERG
Crocodile
Thorndale
Koesters Fn
Dwarsfn
Bosman
Krugersdorp
Strydom
Kaalfontein
Zuurfontein
Store
Bronkhorst
Wilde
Fourie
Meyer
de Wet
Grobler
Swarts
Olifants
JOHANNESBURG
5600
Boksburg
The Springs
Brandvlei
Doornfontn
Esterhuis
Holfontn
Coetzee
Rietpan
Vetpan
Grootbosch
Smit
Retief
Meyburg
HOUT
TAFEL
Vorster
LICHTENBURG
Erasmus
Doornpoort
DOORN
KLN TAFEL
Koesters Fn
Groenfontn
Buffels Hoek
RUSTENBURG
Kroonstad
Wallmans Kop
Morgenzon
Garon
Beersheba
Bethany
Hebron
Polonia
Saltpan
THE PYRAMIDO
ZWART
Jericho
J. Mahalie
KAMEEL
ZEINS
Swampy
Makapan
Mosella
Sjambok
Saul
Aapies
Wallmansthal
Wonderboom
Erste Fabk
Aapies
TWEEDE POORT
EERSTE POORT
VLEIG
VAALWATERS NEK
LOS
WITFONTEIN
Hartingsburg
Witfontn
Hartebeest Poort
Klip
Elands
Boshof
ROOI
Zand
Wachteenbietje Drift
Makeeb Nek
Schoenbe's Drift
Oor
Zand
Zand
Zand
Zand
Nyl
Nyl
K^t Nyl
BADS
BERG
Nyl
K^t Vlakte
Springbok Vlakte
Plat
Klipfontein
Saul
Aapies
Leeuw
Bartebeest
Kameel Poort
Moos
Rhenoster
Elands R.
Bronkhorst Spruit
Brug St.
Olifants
Wilde
Rhenoster
Groot
Schoen
Bot
Has
Lulu
Ros
Mali
Molipsi
Chuni
Strydpoort Berg
Mapashlela
Zebedele
Pietersburg
4270
Marais
Haenertsburg
Wright
Legalie
Klipdam
3960
Rhenoster Poort
Malitz
Matala
Berricht
Maraba
Marabastadt
Turf Fontn
Makapan
Mynhardt
Mura Dr.
Potgieter Rust
Sterk
Hanglip
Spioenkop
Palala
K^t Palala
Zandegs
Dwars
Geelhout
Zand River Mts
Methemachana
Tobias Zyn
Kalkput
Zebedele
Chuni
F^t Olifant
Mapashlela
Strydpoort Berg
Smitsdorp
Malipsi
Mali
Ros
Lulu
Botha
Rensburg
Potgieter
Vermaak
Cobalt Mines
Kalk
Kameel Poort
Elands
Buffels
Bloed
MASEPE
MALEO
OLIFKOP
Alman's Drift
Neuhalle
Mabaan
Hoogebomen
McCabe's Vlei
Brink Fn
Commissie Drift
Verlust
Poort
Poardeplaats
Pan
Sekwati
Klipfontein
Kalkput
Zebedele
Chuni
F^t Olifant
Modimuli
Nyl
Boshof
Hoek
Gat Kop
Krans Kop
Nylstroom
Natorp
Badsberg
K^t Nyl
Zand
Zand
Zand
Zand
Makeeb Nek
Schoenbe's Drift
Oor
Wachteenbietje Drift
Elands
Klip
Hartebeest Poort
Witfontn
Boshof
Crocodile
Rooi
Witfontein
Los
Vaalwaters Nek
Vleig
Tweede Poort
Eerste Poort
Aapies
Hartingsburg

Pietersburg
Haenertsburg
Leydsdorp
Smitsdorp
Agatha
Lydenburg
Middelburg
Barberton
Nylstroom
Boksburg
Carolina
Potgietersrust
Zebedele
Tobias
Modimuli
Matala
Malitz
Klipdam
Legalie
Houbush
Umshaka
Marais
Wright
Selati
Olifants
Spitzkop
Tachu
Setluli
Mashimala
Duiker
Harrish
Mucho
Katsuadira
Thabina
Nodobitat
Volk
Marola
Mahogailo
Malecapa
Blyde
Maranlenan
Mariti
Marule
Marule Flats
Mastimian
Ramkwa-Samsata
(Buffels Kop)
Babati
Magange
Mayarin
Mariep
Mahaman
Mahlamahale
Mankele
Mazelema
Makaisu
Matafin
Kobamshadi
Noaritsi
Munkangari
Mahusun
Jonas
Matali
Setlali
Spabanani
Ututu
Mabitoka
Makutsanin
Endu
Lozies
5000
Pretorius
Spitzkop
Devils
Hotel
Boubosch
Stads
Blinkwater
Alkmaar
Welspruit
Crocodile
Elands-hoek
Elands
Helvetia
Esbach
Machado-dorp
Witrand
Steenkamps Berg
Kruger
Kaap
Jamestown
Avoca
Eureka
Kamhlubana
Hwanga
Hora
Tafelkop
Nooitgedacht
Homphlomo
Dalmanutha
Vlakfn
Bergendal
Camering
Wonderfn
Belfast
Panstn
Wheeler
Grobler
Vermaak
Potgieter
Rensburg
Cobalt Mines
Pots
Schoeman
Bokgat
Schrik
Modder
Roosenkal
Mokwana
Gwangoma
Maloch
Masepe
Buffels
Bloed
Olifkop
Maleo
Bakenkop
Khalathutlu
Magnet Height
Steelpoort
Krugerspost
Ohrigstad
Spekboom
Waterval
Pilgrims Rest
Anderson
7000
Maugh
18720
Moodles
Nuckles
Sabi
Manupi
Setlali
Matali
Munji
Matermerie
Matermbai
Sabi
Lebombo Mts
Groot Letaba
Ngwenyen
Ridsolo
Senti
Nzhelele
Letaba
Black Hills
Majoji
Mosungulutsi
Koodoes
Groot
Volk
Thabina
Nodobitat
Selati
Murchison
Mutati
Spitzkop
Leydsdorp
Haenertsburg
Agatha
Houbush
Umshaka
Legalie
Klipdam
3960
Rhenoster Poort
Malitz
Matala
Berricht
Maraba
Marabastadt
4270
Turf Fontn
Smitsdorp
Makapan
Myrhardt
Potgieter Rust
Mura Dr.
Spioenkop
Hanglip
Geelhout
Zwagers Hoek
Zand River Mts
Methemachana
Sterk
Dwars
Zondags
Palala
Kl. Palala
Mapala
Makapan
Malipsi
Chuni
Strydpoort Berg
Pienaars Kek
Mapashlela
Roštock
Waterkop
Lulu Berg
Sakun
Tokani
Ft Olifant
Chuni
Zebedele
Kalkput
Sekwati
Geluk
Klipfontein
Kransberg
Natorp
Kl. Nyl
Nyl
Boshof
Paardeplaats
Pan
Commissie Drift
Verlust
Brinkfn
McCabe's Vlei
Hoogebomen
Mabaan
Neuhalle
A. Mabaan
Alman's Drift
Maluk
Springbok Vlakte
Plat
Klipfontein
Elands
Kameel
Kameel Poort
Leeuw
Bartebeest
Saul
Aapies
Pienaars
Wallmansthal
Kalk
Klip
Moos
Bothas
Schoeman
Enkoel
Wilde
Bronkhorst
Bronkhorst Spruit
Rhenoster
Brug
Olifants
Wonder
Nieker
Kl. Olifants
Vaalwater
Breytenbach
Rensburg
Warmbath
Thee
Libedzi
Steynsdorp
Buffels
Liliburn
Majoors
Forbes
Buckhan's
Makangeni
Stores
Umkambeni
Umbolosi
Komati
Umzinto
Lomati
Makassa
Wyldesdale
Hoodoorkindale
Store
Drift
Manang
Impun
Munji
Matashlo
Lebombo Mts
Pala
Masitondi
Mayarin
Magange
Babati
Manyuki
Ramkwa-Samsata
Maranlenan
Mastimian
Marule Flats
Marule
Mariti
Blyde
Malecapa
Mahogailo
Marolla
Diuke
Mashimala
Duiker
Harrish
Mucho
Setluli
Olifants
Spitzkop
Tachu
Selati
Mutati
Murchison
Leydsdorp
Haenertsburg
Agatha
Houbush
Umshaka
Legalie
Klipdam
3960
Rhenoster Poort
Malitz
Matala
Berricht
Maraba
Marabastadt
4270
Turf Fontn
Smitsdorp
Makapan
Myrhardt
Potgieter Rust
Mura Dr.
Spioenkop
Hanglip
Geelhout
Zwagers Hoek
Zand River Mts
Methemachana
Sterk
Dwars
Zondags
Palala
Kl. Palala
Mapala
Chuni
Strydpoort Berg
Pienaars Kek
Mapashlela
Roštock
Waterkop
Lulu Berg
Sakun
Tokani
Ft Olifant
Chuni
Zebedele
Kalkput
Sekwati
Geluk
Klipfontein
Kransberg
Natorp
Kl. Nyl
Nyl
Boshof
Paardeplaats
Pan
Commissie Drift
Verlust
Brinkfn
McCabe's Vlei
Hoogebomen
Mabaan
Neuhalle
A. Mabaan
Alman's Drift
Maluk
Springbok Vlakte
Plat
Klipfontein
Elands
Kameel
Kameel Poort
Leeuw
Bartebeest
Saul
Aapies
Pienaars
Wallmansthal
Kalk
Klip
Moos
Botha's

Leydsdorp
Selati
Olifants
Groot Letaba
Ngwenen
Ridsolo
Umshaka
Letaba
BLACK HILLS
MAJOJI
MURCHISON
Matati
SPITZKOP
TACHU
MOCHO
MASHIMALA
DUIKER
HARRISH
DIUKE
MAHOGAILO
MALEGAPI
Elyde
Riet
Marankwan
Mastmim
Marule Flats
Marule
Mariti
Mariep
Mahaman
Maklamahale
Land
Ohrigstadt
KASPERS NEK
4400
Spekboom
Watervals
Krugerspost
Pilgrims Rest
ANDERSON
7000
Spekboom
MAUGH
18720
MOODIES
Badenhorst
Mahusun
Noaritsi
Maritsi
KOBAMSHADI
MANKELE
Mazelema
Makaisi
Land
Matakin
Munkangari
Jonas
MATALI
Sabi
MANUPI
SETLALI
MUNJI
Matashio
Matermamba
Matermeria
SPABANANI
Sabi
Lipridoti
Ramethonga
GULUMAN
Anhalt
Stoli
Matikudne
Petone
Boi
Magwamba
Shongo
Mokafane
Majubi
Maaka
Usibi
Mundai
Manhissa
Madoma
Mambasheki
Shikwishe
Inkanhen
Sambar
Mulotana
Jargana
Papuli
Shitalane
Tumandiru
Angoana
Pisene
Mashava
Matana
Shefina!
Megara
Morrakwene
Galaal
Mamishonga
Mahululi (Pape!?)
Makando
Kamazi
Komati
Lomati
Umzinto
Eureka
Avoca
KAMHLUBANA
HWANGA
Hora
Barberton
Homphlomo
Dalmanutha
Vlakfn
Wonder
Nooitgedacht
TAFELKOP
KAAPMIS
Jamestown
Godwan Rn
Kaap
KaapMulden
WILSON
Malalsene
Krokodilpt
DEVILS
KANTUR
Elands
Elands-hoek
Helvetia
Crocodile
Heyman
Sterk
Houtbosch
Shads
Alkmaar
Welsprult
Crocodile
Gorsprong
Nelspies Drift
Londolt
Sikosi
Mahamba
Mabitoka
ENDU
LOZIES
5000
PRETORIUS
SPITZKOP
DEVILS
Hotel
K.ALLEEN
KORF
Zuiker
Boosch
BERG
Schoeman
7000
MAKUTSANINI
UTUTU
Blinkwater
Nel

26

27

MAFEKING

MARICO

ZEERUST

OTTOSHOOP

RUSTENBURG

LICHTENBURG

KROONSTAD

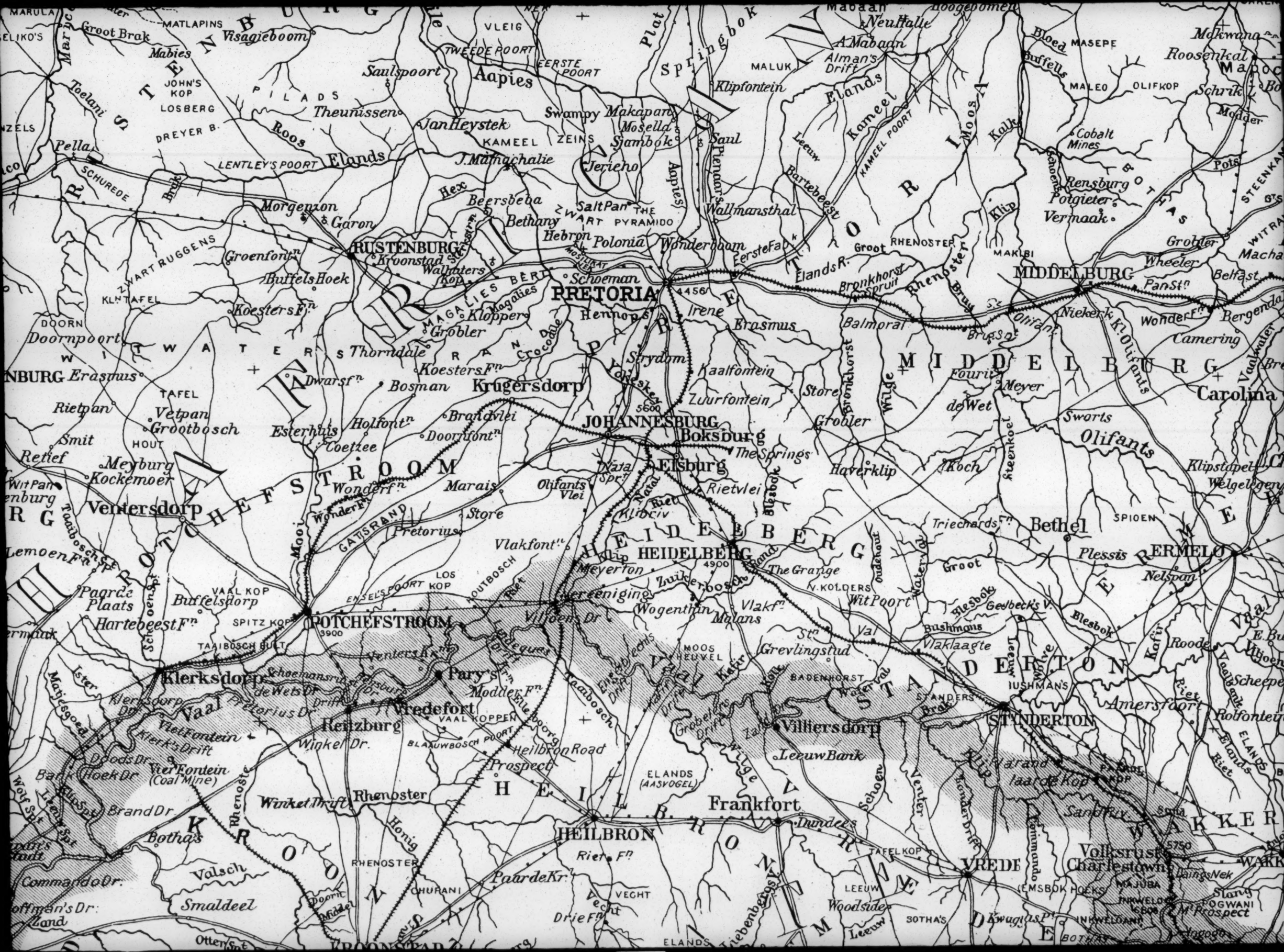
POTCHEFSTROOM

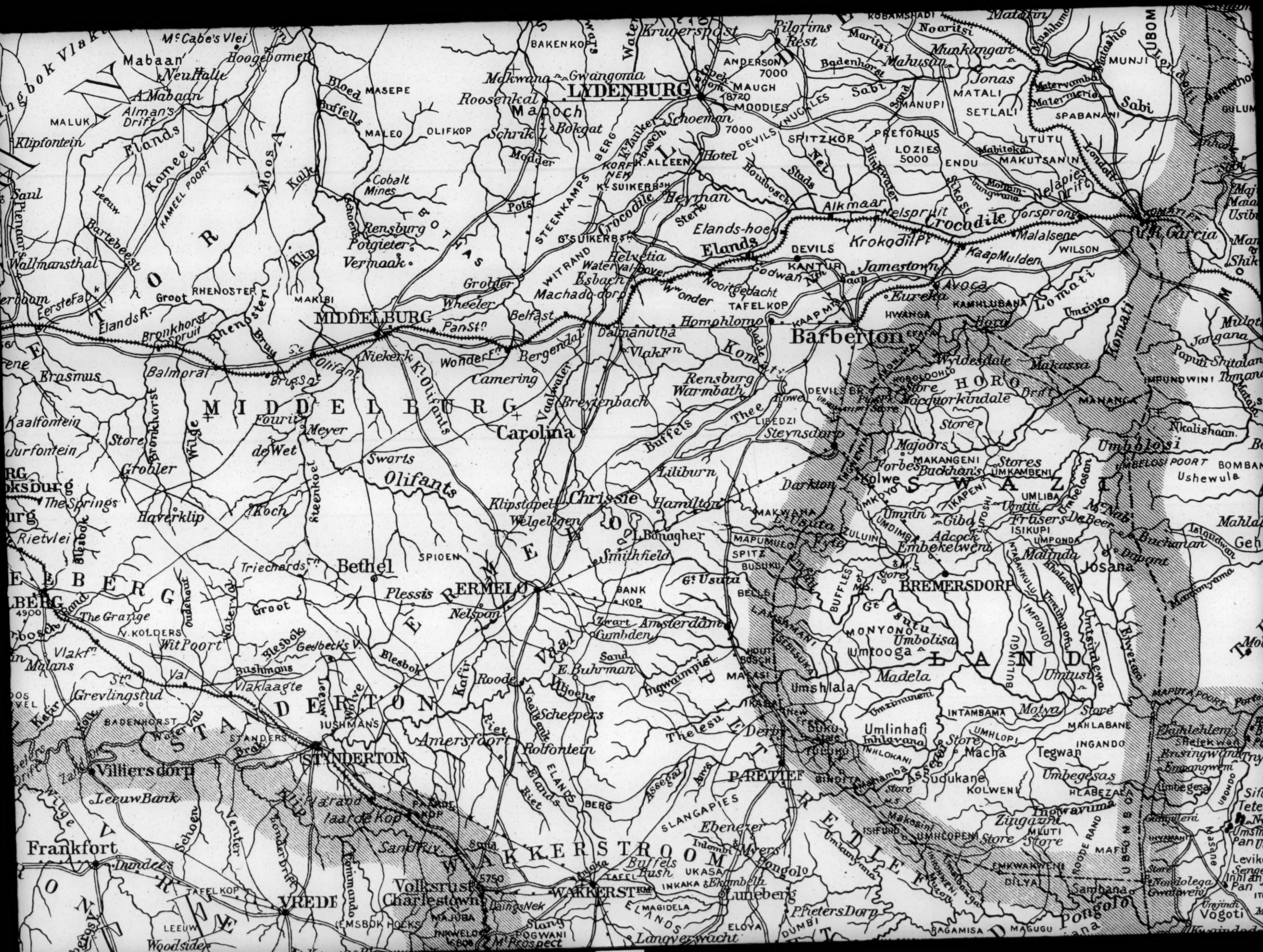
VRYBURG

TAUNGS

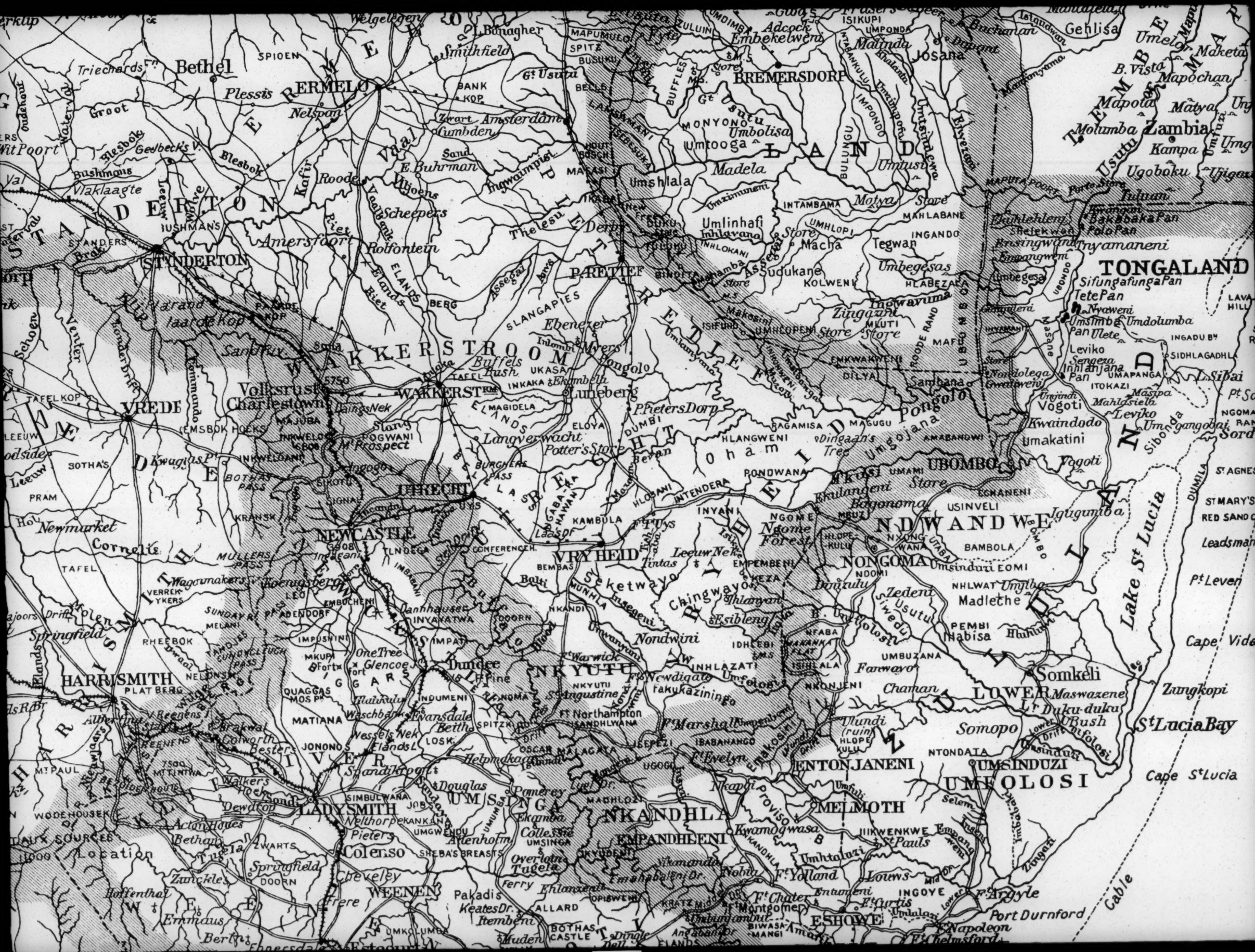
BLOEMHOF

Zeerust
Ottoshoop
Mafeking
Rooigrond
Lichtenburg
Rustenburg
Potchefstroom
Klerksdorp
Vryburg
Taungs
Bloemhof
Mamusa
Kroonstad
Vredefort
Parys
Vereeniging
Heilbron
Frankfort
Reitzburg
Rhenoster
Venterspost
Randfontein
Krugersdorp
Pretoria
Johannesburg
Boksburg
Springs
Nigel
Heidelberg
Potgietersrust
Pietersburg
Warmbaths
Nylstroom
Rustenburg
Brits
Hartebeestfontein
Ventersdorp
Wolmaransstad
Schweizer-Reneke
Delareyville
Lichtenburg
Zeerust
Ramathlabama
Pitsani Bakluku
Pitsani
Motloutse
Tati
Shashe
Limpopo
Crocodile
Marico
Notwane
Kolobeng
Molopo
Mabuli
Lotlakana
Makgori
Kuruman
Hex
Vaal
Harts
Schoon
Klein
Groot
Zwart Ruggens
Witwatersrand
Magaliesberg
Dwarsberg
Suikerbosrand
Gatsrand
Witpoort
Swartruggens
Doornpoort
Kl. Tafel
Buffelshoek
Groenfontein
Koestersfontein
Thorndale
Erasmus
Dwarsfontein
Bosman
Kruger
Brandvlei
Esterhuis
Holfontein
Doornfontein
Coetzee
Wonderfontein
Marais
Store
Pretorius
Vlakfontein
Outbosch
Ensel's Poort Kop
Los
Spitz Kop
Taaibosch Bult
Venterskroon
Schoemansrust
Pary's
Modderfontein
Vaal Koppen
Blauwbosch Poort
Winkel Dr.
Prospect Hill
Rietfontein
Alerk's Drift
Vaal Dr.
Klerksdorp Dr.
Potchefstroom Dr.
Schoemansrust Dr.
de Wets Dr.
Pretorius Dr.
Driftfontein
Isterspruit
Majesgoed
Makwasi Spt
Wolf Spt
Lion Spt
Elliot Spt
Brand Dr.
Bark Hoek Dr.
Doods Dr.
Vier Fontein (Coal Mine)
Winket Drift
Rhenoster
Rhenoster Kop
Honig
Chuani
Commando Dr.
Hoffman's Dr.
Otter Spt
Botha's
Valsch
Smaldeel
Paardeberg
Wolmaransstad
Sheppardson Store
Coleman Salt Pan
Louw Verster
Swartpoel
Engelbrecht
Pietersons
Riet Fn.
Boomplaats Spt
Kraai Pan Siding
Mahikeng
Khuiwana
Molatlwe
Kopetta
Leeuw Pan
Maribogo Pan
Barber's Pan
Zout Pannen
Brack Pan
Groot Harts
Kuhn
Badenhorst
Klasen
Coetze
Lemoenfontein
Gestopte Fn.
Korranna Fn.
Vermaak
Pagrde Plaats
Hartebeestfontein
Schoenspruit
Taaibosch Spt
Brak Spt
Korannaberg
Liebenberg
Heveling
Van Zyl
Jacobs
Nieuwoudt
Massouw's
Katdoorn Plaat
Botes
Kiekerks Rust
Schoon Gezicht
Dry Harts Siding
Dry Harts
Pudimpe Siding
Moubisi
Taungs
Manthe
Magagare
Mogogong
Moshweding
Mathile
Motloleng
O'Reilly's Salt Pan
Lawn Hill
Fort
Tlakgamina
Geelsa
Doorn Bult Siding
Devondale Siding
Massouw's
Klein Kwaien
O'Reilly's Station
Losaba
Tigerkloof Siding
Takwanen
Myburghs Fontein
Brussels Siding
Gapopo
Pudimpe
Mosita
Setlagole
Morakwa
Maretsane Siding
Motlhakaditsi
Mahukubu
Maribogo
Wonder Klip
Boson
Kraai Pan Siding
Khudungkwane
Mabakwane
Kudankwe
Matlapin
Kukume
Motlobolok
Kwedi
Sedilomolomo
Israel
Sante
Madibi Siding
Kosa
Mafeking
Mafeking Siding
Molopo
Mosita
Setlagole
Maribogo
Morokwa
Maretsane Siding
Motlhakaditsi
Mahukubu


RUSTENBURG
PRETORIA
MIDDELBURG
Krugersdorp
JOHANNESBURG
Boksburg
Elsburg
Springs
Germiston
Benoni
Brakpan
Nigel
Potchefstroom
Klerksdorp
Vredefort
Reitzburg
Rhenoster
Heilbron
Frankfort
Villiersdorp
Standerton
Vrede
Volksrust
Charlestown
Wakkerstroom
Heidelberg
Ermelo
Bethel
Carolina
Witbank
Vereeniging
Vanderbijlpark
Meyerton
Vereeniging
Aapies
Saulspoort
Theunissen
Jan Heystek
Swampy Makapan
Mosella
Sjambok
Jericho
Saltpan
Pyramido
Wallmansthal
Wonderboom
Polonia
Hebron
Bethany
Beersheba
Hex
Morgenzon
Garon
Groenfontein
Buffelshoek
Schoeman
Kloppers
Grobler
Doornpoort
Thorndale
Koesters F.
Dwarsf.
Bosman
Erasmus
Rietpan
Vetpan
Grootbosch
Smit
Retief
Meyburg
Kockemoer
Ventersdorp
Wondf.
Marais
Store
Pretorius
Gatsrand
Vlakfont.
Lemoenf.
Paardekraal
Buffelsdorp
Hartebeestf.
Schoonspr.
Taaiboschspr.
Klerksdorp
Schoemansrust
Pary's
Modderf.
Vaal
Vietfontein
Afterk's Drift
Viervontein (Coal Mine)
Winkel Dr.
Winket Drift
Botha's
Valsch
Smaldeel
Commando Dr.
Hoffman's Dr.
Zand
Otterspr.
Heilbron Road
Prospect
Rietf.
Paardekr.
Vecht
Driefn.
Elands (Aasvogel)
Frankfort
Villiersdorp
Leeuw Bank
Vaal
Vaalbank
Riet
Elands
Rietvlei
Klipriv
Natal
Olifants Vlei
Olifants
Kaalfontein
Zuurfontein
Strydom
Irene
Erasmus
Balmoral
Bronkhorst Spruit
Rhenoster
Elands R.
Eerste Fabrieken
Wheeler
Belfast
Pan St.
Nieker k.
Olifants
Camering
Wonderf.
Bergenda
Carolina
Fourie
Meyer
de Wet
Sworts
Olifants
Klipstapel
Welgelegen
Bethel
Triechards F.
Plessis
Nelspan
Groot
Modder
Schrik
Roosenkal
Mdkwana
Maloc
Bloed
Buffels
Masepe
Maleo
Olifkop
Cobalt Mines
Potgieter
Rensburg
Vermaak
Grobler
Wallmansthal
Saul
Jericho
Aapies
Springbok
Plat
Klipfontein
Alman's Drift
Neuhalle
Maloan
Doogepomeln
Kameel
Eland's
Kameel Poort
Leeuw
Bartebeest
Kalk
Moos
Klip
Groot Rhenoster
Maklbi
Middelburg


LYDENBURG
MIDDELBURG
Carolina
Barberton
ERMELO
BREMERSDORP
STANDERTON
WAKKERSTROOM
PRETIEF
Bethel
Chrissie
Volksrust
Frankfort
VREDE
Villiersdorp
Balmoral
Machadodorp
Belfast
Dalmanutha
Waterval Boven
Waterval Onder
Nelspruit
Alkmaar
Jamestown
Avoca
Eureka
Lomati
Umzinto
Umbolosi
Josana
Malinda
Umtusi
Umtooga
Umbegesas
Inqwayuma
Sudukane
Tegwan
Macha
Motya
Umlinhafi
Umtsindeva
Majoors
Forbes
Darkton
Kolwe
Stores
Luneberg
Pongolo
Sambana
Majuba
Laingsnek
Amsterdam
Zwart Kumbden
Smithfield
Thelesu
Derby
Ingwaumpisi
Roode Berg
Olifants
Klipstapel
Welgelegen
Haverklip
Rietvlei
Grobler
Wallmansthal
Saul
Klipfontein
Mabaan
Neuhalle
Hoogebomen
McCabe's Vlei
Alman's Drift
Eland's Kameel
Kameel Poort
Moos
Kalk
Leeuw
Bartebeest
Eland's R.
Bronkhorst Spruit
Rhenoster
Groot Rhenoster
Maklbi
Erasmus
Kaalfontein
Grobler
Bronkhorst
Wilge
Rietvlei
Blesbok
Triechards Fn
Plessis
Nelspan
Groot
The Grange
V. Kolders
Wit Poort
Geelbeck's V.
Bushmans
Vlaklaagte
Grevlingstad
Badenhorst
Iushman's
Standers
Brak
Zaai
Leeuw Bank
Frankfort
Tafelkop
Woodside
Leeuw
Emsbok Hoeks
Majuba
Inkwelo
Mt Prospect
Pogwani
Elands Berg
Parde Kop
Sandfly
Tafelkop
Inlembi
Myers
Buffels Bush
Ukasa
Inkaka
Ekumbeta
Elmagidela
Eloya
Dumbi
Langverwacht
Pfietersdorp
Lilliburn
Hamilton
Klipstapel
Welgelegen
Smithfield
Zwart Kumbden
Amsterdam
Nelspan
Plessis
Bethel
Olifants
Swarts
Koch
Steenkoel
Meyer
de Wet
Fourie
Grobler
Kaalfontein
The Springs
Rietvlei
Blesbok
Waterval
Oudehout
Schoen
Venter
Bronkhorst
Wilge
Tenderdrift
Kimmando
Vaalwater
Breytenbach
Buffels
Thee
Libedzi
Steynsdorp
Rensburg
Warmbath
Vlakfn
Wonderfn
Bergendal
Camering
Nieker
K. Olifants
Olifant
Bruss
Brug
Pan St
Wheeler
Grobler
Rensburg
Botha
Potgieter
Vermaak
Cobalt Mines
Modder
Schrik
Bokgat
Roosenkal
Mokwana
Gwangoma
Bakenko
Masepe
Buffels
Maleo
Olifkop
Maluk
Mabaan
Hoogebomen
Krugerspost
Pilgrims Rest
Anderson 7000
Maughan 8720
Moodies
Nuckles
Schoeman 7000
Hotel
Devils
Spitzkop
Pretorius
Lozies 5000
Endu
Mahitoka
Makutsanin
Ututu
Spabanani
Matali
Setlali
Manupi
Sabi
Munjin
Matavambe
Matermerie
Munkmgart
Mahusan
Jonas
Badenhorst
Maritsi
Noaritsi
Matafun
Kobamshadi
Mapulumulo
Spitz
Busuku
Bells
Lamshmani
Seresuka
Houtbosch
Mafasi
Ikabai
Buku
Tucuku
Inhlokani
Umlinhafi
Inhlavana
Umhlopi
Ingando
Macha
Tegwan
Motya
Store
Mahlabane
Intambama
Umzimuneni
Umshlala
Madela
Umtooga
Monyono
Umbolisa
Gt Usutu
Bells
Mp.
Store
Buffles
Umtindeva
Impondo
Umtsindeva
Bulungu
Umtsindeva
Umtsindeva
Umtsindeva

POTCHEFSTROOM
3900
Klerksdorp
Vredefort
Reitzburg
Parys
Vaal
Rhenoster
Winkel Dr.
Winkel Thrift
Prospect
Heilbron Road
Vaal Koppen
Blaauwbosch Poort
Vaal Kop
Vaal Drift
Vaalbosch
Villiersdorp
Leeuw Bank
Elands (Aasvogel)
Frankfort
HEILBRON
Rhenoster
Rhenoster
Honig
Valsch
Smaldeel
Doorn Kuil
Otter Spt
KROONSTAD
Jordaan
Hodgmans berg
Elands
Kaalfontn
Hamans
Groot
Heng
Lindley
Kaatvlei
Riet Spruit
Bloem
Ventersburg
Ventersburg
Jos
Koe
Memel
DuPreez Laager
Zand
KOPJE ALLEEN
BIDDULPHS
Welgelegen
Winburg
Boschjes Spruit
WINBURG
Laai
Taaibosch
Vet
Riet Gat
Riet Spruit
Naald
Kafir
Paarde
Leeuw
Wonder
Lots Pillar
Kl. Vet
Allandale
Koranna
Hammoria
Klokolan
Menschvreters
Viervoet
Koranna
Sannas Post
Thabanchu
Thabanchu
Raruis
Hoefelrok
LADYBRAND
Modder R.
Caledon
Brandwater Basin
Ficksburg
Ficksburg
Butha
Butha
Leribe
Molapo
Thlotsi
Tsikwane
Kokolosing
Sclebala
Spitz
Koloyane
Phatona
Phutiat
Cana
Seng
Mapshuane
Pitolo
Jonathan
Monika
Tandjes
Vechtkop
Drie Fn
Paarde Kr.
Riet Fn
Chupani
Rhenoster
Vaal Kop
Vaal Drift
Vaalbosch
Ventersburg Rd
Villiers Dr
Meyerton
Vereeniging
Wogenthin
Vlakfn
Milans
Grobelers Drift
Ridge
Schoen
Venter
Tafelkop
Lindees
Woodside
Leeuw
Pram
Hol
Newmarket
Cornelis
Majoors Drift
Springfield
Elands R.
Palmietfn
Liebenbergs Vlei
Ramsbottoms Post
Witte Bergen
Kafirkop
Witzies Hoek
Fouries Burg
Uithoek
Roode Bergen
Mt. Paul
Mt. Tintwa
Montaux Sources
Caledon
Porcho's
Location
Wodehouse
Leitsika
Malope
Elands
Liebenbergs Spt
Heilbron
Rietfontein
Kaffirs Drift
Brandwater


Welgelegen
Bethel
SPIOEN
Triechards Fn.
Smithfield
Banagher
Plessis
Groot
Nelspan
BANK KOP
Gt Usutu
Zwart Amsterdam
Lumbden
Sand
E. Buhrman
Vlijoens
Roode
Vaalbank
Scheepers
Riet
Amersfoort
Rolfontein
Elands Riet
Assegai Burn
Thesigi
Derby
PRETIEF
SLANGAPIES
Ebenezer
Inlombi
Myers
Buffels Bush
UKASA
Inkaka
Ekombela
Luneberg
Pietersdorp
Langverwacht
Potter's Store
Dingaan's Tree
Ohamil
HLANGWENI
PONDWANA
UBOMBO
Vogoti
Kwaindodo
Umakatini
Mkusi
Bagonoma
USINVELI
Igugumba
NDWANDWE
Ngome Forest
NONGOMA
Umsinduri
EOMI
Madlethe
Zedent
Siwedu
Usutu
PEMBI
Nabisa
Somkeli
LOWER Umfolosi
Somopo
Ulundi (ruins)
Fanwayo
Chaman
Nkonjeni
Inhlazati
Nondwini
Esibleng
Chingwayo
Thlangan
Seketwayo
Insegeni
Munhla
Nkandi
Bolti
Tintas
Leeuw Nek
Isithumba
Bembas
Empembeni
Keza
Ndondi
Danzulu
Nhlwat
Umgiba
Nfaba
Makanka Flat
Idhlebi
Ishilala
Umbuzana
Mbombo
Lake St Lucia
Cape Vidal
Zungkopi
St Lucia Bay
Cape St Lucia
Port Durnford
Cable
Leadsman
Pt Leven
St Agnes
St Mary's
Red Sand C
Dumila
Ngoma
Sordwana
TONGALAND
Sifungafunga Pan
Tete Pan
Nyaweni
Umsimba Pan
Umdolumba
Ulete
Leviko
Sengeza
Innhanjana Pan
Umapanga
Itokazi
Masipa
Mahlasiela
Sidhlagadhla
Ingadu Bn
Lavalhill
Sibai
Pt So
Umlamgangobai
Umlazane
Nyamaneni
Tuluan
Bakabaka Pan
Polo Pan
Ugoboku
Ujigazi
Umfuzi
Umlumba Zambia
Kampa
Mapoka
Matya
Mapochan
Maketa
Umelo
B. Vista
Molumba
Gehlisa
Isloudwan
Buchanan
Josana
Malinda
Embekelweni
Adcock
Isikupi
Umponda
Gt Usutu
Bremersdorp
Store
Buffles Ms.
Bellsi
Lamshmani
Sibesuka
Mapumulo
Spitz
Busuku
Umdimba
Zuluin
Umtooga
Monyono
Umbolisa
Madela
Umshlala
Umtusi
Bulungu
Impondo
Umtsindeva
Khalanta
Mahlabane
Ingando
Tegwan
Macha
Matya
Umbegesas
Hlabezala
Sudukane
Kolweni
Inhlavana
Inhlokani
Umhlopi
Ingwavuma
Zingazini
Miuti
Umhlopeni
Isifundo
Makosini
Umlamyamo
Inkonkweni
Enkwakweni
Dilya
Sambana
Roode Rand
Mafo
Ubombo
Umsinga
Nkandhla
Empandheni
Melmoth
Umhtotazi
Kyamogwasa
Iikwenkwe
St Pauls
Ft Yolland
Louws
Ingoye
Ft Argyle
Ft Curtis
Ft Chelmsford
Ft Napoleon
Eshowe
Umlalazi
Entumeni
Montgomery
Kratz Mid
Umhumandhut
Biwasa-Mangi
Amatikulu
Ft Evelyn
Ft Marshall
Ft Warwick
Ft Newdigate
Ft Northampton
Ft Pine
Ft Angustine
Ft Chatter
Ft Yolland
Ft Arthur
Ft Tinta
Ft Chelmsford
Ft Napoleon
Ft Argyle
Ft Curtis
Ft Montgomery
Ft Chatter
Ft Yolland

Warmbath
Thee
Buffels
Steynsdorp
LIBEDZI
DEVILS BR.
Store
Majoors
Forbes
MAKANGENI
Buckhan's
Stores
UMKAMBENI
Kolwe
Liliburn
Darkton
Hamilton
MAKWANA
Lisbata
Fyfe
ZULUINI
MAPUMULO
SPITZ
BUSUKU
Gt Usutu
BELLS
Amsterdam
LAMSHAMANI
SHESUKA
MONYONO
Umbolisa
Umtooga
Madela
Umshlala
MAFASI
IKAHAI
Derby
SUKU
TUGUNU
INHLOKANI
PAARTJEF
Assegai
Bush
SLANGAPIES
Ebenezer
Myers
Pongolo
UKASA
INKAKA
Ekumbela
Luneberg
MAGIDELA
ELOYA
DUMBI
PietersDorp
Potter's Store
Bevan
Ohamu
HLANGWENI
MAGUGU
RAGAMISA
Dingaan's Tree
Umgoja
AMABANDWI
PONDWANA
UMAMI
Ekulangeni
Store
ECHANENI
Bagonoma
USINVELI
INTENDERA
HLOBANI
INYANI
KAMBULA
Laasdorp
VRYHEID
BEMBAS
Bolti
Seketwayo
Chingwayo
Esibleng
Nondwini
NKANDI
MUNHLA
Insegeni
NKYUTU
Warwick
Newdigate
Rakukazininga
St Augustine
Ft Northampton
ISANDHLWANA
Ft Marshall
OSCAR MALAGATA
IBABANANGO
Ft Evelyn
UGOGO
Pomeroy
MAGHLOZI
Nkapti
Umfuli
Makosini
ISIFUNDO
UMHLOPENI
Umlamyana
Umbombo
Store
Sambana
DILYA
ENKWAKWENI
Luhoshi
Umtiti
Gibo
Umntn
Fraser's
ISIKUPI
UMLIBA
UMKHOYO
UMDIMBA
Adcock
Embekelweni
Malinda
UMPONDA
Josana
Khalanda
Umsinga
Umtshalweni
Impondo
Bulungu
Umtsitalewa
Elsyezini
BREMERSDORP
Store
M.S.
Buffles
Umhlatuzana
Ngome
Forest
NGOME
MBUZI
NDWANDWE
HLOPE-KULU
NYONG WANA
UTABA
BAMBOLA
Umsinduzi
EOMI
NONGOMA
NDOMI
Dumulu
NHLWAT
Umgiba
Madlethe
Zedeni
Usutu
Siwedu
PEMBI
Inabisa
Hluhluwe
UMBUZANA
Farwayo
Somkeli
Chaman
LOWER
Maswazene
Lr Duku-duku
Bush
Somopo
NTONDAIA
UMSINDUZI
UMFOLOSI
ENTONJANENI
Ulundi
(ruins)
HLOPE
KULU
Umfolosi
Store
NKONJENI
INHLAZATI
ISIHLALA
NFABA
MAKANKA FLAT
IDHLEBI
B. Umfolosi
Farm
Inhlavana
INHLOKANI
INGANDO
Tegwan
Macha
Umbegesas
HLABEZALA
KOLWENI
Ingwavuma
Zingazini
MIKUTI
Store
MAFU
ROODE RAND
UBOMBO
Umbegesa
Umgwalweni
Nondolega
Store
Ingwempisi
Umlinhafi
Umzimuneni
INTAMBAMA
Motya
Store
MAHLABANE
Umtusi
Umtsitalewa
Elsyezini
Impondo
Bulungu
Khalanda
Umsinga
Umtshalweni
Mangenyama
Dupont
Buchanan
McNab
De Beer
Isiqudwan
Gehlisa
Mahlalela
Umtiti
Gibo
Umntn
Umkhoyo
Umdimba
Ikapeni
Umkambeni
Umliba
Poort
Umbolosi
Ushewula
Bombai
Nkalishaan
Tumandinini
Impundwini
Manana
Segwan
Matola
Mashava
LOURENÇO MARQUES
Elephant I.
Inyak I.
Delagoa Bay
C. Colatto
Katembe
Puputi
Flamingo Pt
Old Tembe Drift
Mameni
Mapula
Umeloi
Maketa
Mapochan
B. Vista
Mapota
Matya
Unjeji
Molumba
Zambia
Kampa
Umguga
Ugoboku
Ujigaziga
FLORENCE PEAK
Oro Pt
R. Kosi
Tuluan
Mapuda Poort
Porto Store
Dhuhlehleni
Sheikwad
Bakobaka Pan
Polo Pan
Ingamani
Emangweni
Nyamaneni
Red Sand Cliff
Black Rock
Pt Boteler
LAVA HILL
SANDU RANGE
INGADU Bay
SIDHLAGADHLA
Leviko
Sengeza
Inhlanjana Pan
Nyaweni
Umsimbo Pan
Umdolumba
Ulete
Nondolega
Gwalweni
UMAPANGA
ITOKAZI
Masipa
Mahlasiela
Leviko
Vogoti
Unjindi
Kwaindodo
Umakatini
Vogoti
Sibonda
Umgangobai
L. Sibai
Pt Sordwana
NGOMANA RANGE
Sordwana Bay
ST AGNES
ST MARY'S
RED SAND CLIFF
Leadsman Shoal
Pt Leven
Cape Vidal
Zungkopi
St Lucia Bay
Cape St Lucia
Lake St Lucia
DUMILA
Holland Pt
Wakeley Pt
R. Flamingo
Inyack Penta
TONGALAND
ZULULAND
26
27
28

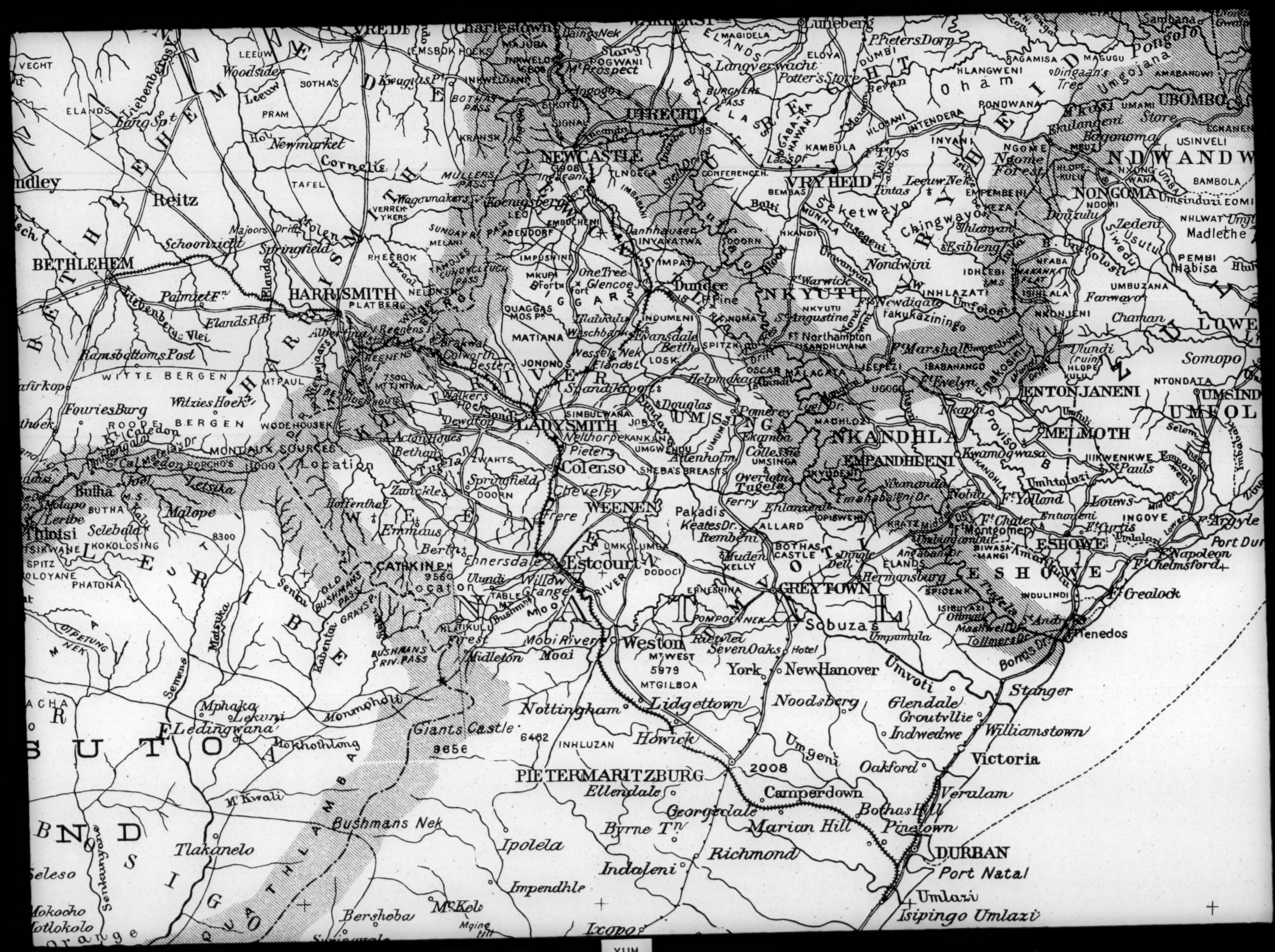
28

29

30

Christiana
Border Siding
Gr^t Boetsap
Kl^n Boetsap
Barkly
Rutland
Fourteen Streams
Warrenton
Station
Klipdam's Pont
Drie Fn
Gr^t Constantia
Wonder Fontn
KORJE ALLEEN
Kaatvlei
Riet Spruit
Bloem
Ventersburg
DuPreez Laager
Zand
Ventersburg
Jos
Kool
Memel
BID
Rupert
Siyoni
Zon
Onder
Spitz Kop
Koodoe
Windsorton
Likatlong
Washington
Delports
Windsorton Slypklip
Drie Fontein
Lang Laagte
Bult Fontn
Welgelegen
Winburg
Boschjes Spruit
Venduie
GRIQUALAND
WEST
BARKLY
Riverton Road
Macfarlane
Cranfield
Rifel
Tarantaal
Priel
BOSHOF
Kwaggahoek
Carlton
Zout Pan
Haagenstad Salt Pan
Brandfort
Station
WINBURG
Riet Gat
Riet Spruit
Laai
Kafir
Paarde
Leeuw
Wonder
K. Vet
Vet
Taaibosch
Rooi Pan
Paarde
KIMBERLEY
Beaconsfield
Wolve Spruit
Wolve
Truters Drift
Kruid Fn
Doorn
Wimbledon
Koedoc's Rand
Modder
Spytfontein
Banks Drift
Poplar Grove
Abraham's
Paarde
Meetse Siding
Koodoes
Sand Drift
Modder River
Riet
Bosch Pan
Vaal
Dands Graf
Seven Fount^ns
Emmaus
Petrusburg
Leeuw Vlei
Aasvogel K.
JACOBSDAL
Honey Nest Kloof
Verneuk
Kababash Pan
Gras Pan
Riet
Belmont
Koffyfontein
Brak Dam
Ramah
HOPETOWN
Tietjes Pan
FAURESMITH
Koffykuill
Jagersfontein
Touwfontein
Boomplaats
Orange
Hout Kraal
Hondeblut's
PHILIPPOLIS
Springfontein
PHILIPSTOWN
Allandale
Koranna
Menschvreters
Viervoet
Tandjes
Klokolan
Hammonia
Dwal
Los Spt
Glen
Rhenoster
Koranna
Sarnas Post
Thabanchu
Klip Pan
BLOEMFONTEIN
Kaal
Kaalspr^t
Leeuw
Modder
K. Modder
Thabanchu
Hoepelrok
Raruis
Patchoa
LADYBRAND
Mabola
Jackmans Dr.
Leeuw
De Wets Dorp
Kaffir Riv
De Pat
Kaffir R.
Bethany
Edenburg
Reddersburg
Hermon
Phokoane
WEPENER
Bastards Dr
Nasume
Majela
Thaba Bosigo
Morija
Molomo
Seiso
MASERU
Thupakubu
Mas
Tlalele
Berea
Mafeteng
Bushmans Kop
Witte Kop
CALEDON RIVER
Beersheba
Smithfield
Elands Berg
Spitz K.
Hebron
Wolve Kop
Kraans Kop
Mohales Hoek
Bethesda
Outhin
Glyde Dr
Cathcart Dr
Maseru
Thaba
Basutoland
Orange Free State
Transvaal
Cape Province

BLOEMFONTEIN
WINBURG
BRANDFORT
LADYBRAND
FICKSBURG
SENEKAL
LINDLEY
REITZ
BETHLEHEM
HARRISMITH
LADYSMITH
NEWCASTLE
ESTCOURT
WEPENER
ZASTRON
ROUXVILLE
SMITHFIELD
REDDERSBURG
DEWETSDORP
THABA BOSIGO
MASERU
BASUTOLAND
ORANGE FREE STATE
NATAL
CAPE COLONY
Constantia
Wonderfontein
Kaalvlei
Riet Spruit
Elands Dr
Kaalfontein
Lindley
Reitz
Newmarket
Cornelis
Majoors Drift
Springfield
Schoonzicht
Palmietfontein
Elandsriver
Ventersburg
Zand
Du Preez Laager
Bloem
Jos
Koei
Memel
Biddulphs
Welgelegen
Winburg
Boschjes Spruit
Vendue
Bultfontein
Senekal
Zuringkrans
Riet Gat
Rietspruit
Naald
Kafir
Laai
Paarde
Leeuw
Wonder
Lots Pillar
Kafirkop
Witte Bergen
Ramsbottoms Post
Fouriesburg
Witzies Hoek
Uithoek
Rood Bergen
Mt Paul
Wodehouse
Montaux Sources
Location
Caledon
Borcho's
Brandfort Station
Doornfontein
Los Spruit
Allandale
Koranna
Klokolan
Hammonia
Butha
Leribe
Gurg Dr
Molapo
Malope
Letsika
Joel
Thlotsi
Sclebala
Tsikwane
Kokolosing
Spitz
Koloyane
Phatona
Jonathan
Phutiat
Cana
Seng
Pirate
Mapshuane
Mothebetswane
Berea
Sefikeng
Dipetung
Nek
Matsuka
Semens
Mabola
Thupakubu
Tlalele
Masupha
Thaba Bosigo
Mphaka
Lekuni
Ledingwana
Monmphali
Mokhothlong
Giants Castle
Nottingham
Inhluzan
Pietermaritz
Ellendale
Reddersburg
Hermon
Phokoane
Morija
Molomo
Seiso
Majeka
Mt Kwali
Bushmans Nek
Tlakanelo
Seleso
Mokoko
Motlokolo
Malutis
Senqunyane
Maletsunyane
Orange (Senqu)
Ipolela
Impendhle
Bersheba
Springvale
Hatlebeste
Witte Bergen
Woodsville Mt
Matatiele
Clydesdale
Ingeme Hill
Mgine Hill
Excopo
Caledon River
Maseteng
Bushmans Kop
Beersheba
Mohales Hoek
Bethesda
Hebron
Spitz R
Elands Berg
Menschvreters
Viervoet
Koranna
Sannas Post
Thabanchu
Hoepelrok
Thabanchu
Raruis
Patchoa
Leeuw
Modder
Tafel
Verreks Kykers
Wagenmakers
Mullers Pass
Kranskop
Botha's Pass
Signal Hill
Sikoro
Ingogo
Sunday R
Pr Adendorf
Melani
Rheebok
Impushini
Mkupi
Fort
Quaggas Mos Pr
Matiana
Jononos
Mt Tintwa
Reenens
Brakwal
Colworth
Besters
Walkers Hoek
Dewdrop
Acton Homes
Bethany
Tugela
Zwarts
Springfield
Doorn
Colenso
Pieters
Nelthorpe
Simbulwana
Chieveley
Frere
Estcourt
Willow Grange
Ennersdale
Umkomaas
Umdi
Table Mt
Bushmans
Cathkin Peak
9560
Ocatop
Old Bushmans Pass
Gray's Pass
Bushmans Riv Pass
Hlatikulu Forest
Mobi River
Mooi
Midleton
Senku
Kabentu
Berth
Emmaus
Hoffenthal
Zanckles
Location
Montaux Sources
Wodehouse
Rood Bergen
Witte Bergen
Mt Paul
Kafirkop
Ramsbottoms Post
Elandsriver
Albert Falls
Reenens
Majuba
Laing's Nek
Drakensberg
Quathlamba
Malutis
Maletsunyane
Senqunyane
Orange (Senqu)
Thaba Bosigo
Thabanchu
Leeuw
Modder
Caledon River
Bushmans
Witte Kop
Elands Berg
Spitz R
Hebron
Smithfield
Beersheba
Bethesda
Mohales Hoek
Makhaleng
Korn Spruit
Caledon
Tandjes
Meyer
Clocolan
Marika
Egypte
Le Souvenir
Modder R
Thabanchu
Sannas Post
Koranna
Hoepelrok
Raruis
Patchoa
Thaba Bosigo
Mabola
Berea
Maseru
Thupakubu
Tlalele
Masupha
Leeuw
Jackmans Dr
Mphaka
Lekuni
Ledingwana
Monmphali
Mokhothlong
Giants Castle
Nottingham
Inhluzan
Pietermaritz
Ellendale
Bushmans Nek
Tlakanelo
Seleso
Mokoko
Motlokolo
Malutis
Senqunyane
Maletsunyane
Orange (Senqu)
Ipolela
Impendhle
Bersheba
Springvale
Hatlebeste
Witte Bergen
Woodsville Mt
Matatiele
Clydesdale
Ingeme Hill
Mgine Hill
Excopo
Caledon River
Maseteng
Bushmans Kop
Beersheba
Mohales Hoek
Bethesda
Hebron
Spitz R
Elands Berg
Menschvreters
Viervoet
Koranna
Sannas Post
Thabanchu
Hoepelrok
Raruis
Patchoa
Leeuw
Modder
Tafel
Verreks Kykers
Wagenmakers
Mullers Pass
Kranskop
Botha's Pass
Signal Hill
Sikoro
Ingogo
Sunday R
Pr Adendorf
Melani
Rheebok
Impushini
Mkupi
Fort
Quaggas Mos Pr
Matiana
Jononos
Mt Tintwa
Reenens
Brakwal
Colworth
Besters
Walkers Hoek
Dewdrop
Acton Homes
Bethany
Tugela
Zwarts
Springfield
Doorn
Colenso
Pieters
Nelthorpe
Simbulwana
Chieveley
Frere
Estcourt
Willow Grange
Ennersdale
Umkomaas
Umdi
Table Mt
Bushmans
Cathkin Peak
9560
Ocatop
Old Bushmans Pass
Gray's Pass
Bushmans Riv Pass
Hlatikulu Forest
Mobi River
Mooi
Midleton
Senku
Kabentu
Berth
Emmaus
Hoffenthal
Zanckles
Location
Montaux Sources
Wodehouse
Rood Bergen
Witte Bergen
Mt Paul
Kafirkop
Ramsbottoms Post
Elandsriver
Albert Falls
Reenens
Majuba
Laing's Nek
Drakensberg
Quathlamba
Malutis
Maletsunyane
Senqunyane
Orange (Senqu)
Thaba Bosigo
Thabanchu
Leeuw
Modder
Caledon River
Bushmans
Witte Kop
Elands Berg
Spitz R
Hebron
Smithfield
Beersheba
Bethesda
Mohales Hoek
Makhaleng
Korn Spruit
Caledon
Tandjes
Meyer
Clocolan
Marika
Egypte
Le Souvenir
Modder R
Thabanchu
Sannas Post
Koranna
Hoepelrok
Raruis
Patchoa
Thaba Bosigo
Mabola
Berea
Maseru
Thupakubu
Tlalele
Masupha
Leeuw
Jackmans Dr
Mphaka
Lekuni
Ledingwana
Monmphali
Mokhothlong
Giants Castle
Nottingham
Inhluzan
Pietermaritz
Ellendale
Bushmans Nek
Tlakanelo
Seleso
Mokoko
Motlokolo
Malutis
Senqunyane
Maletsunyane
Orange (Senqu)
Ipolela
Impendhle
Bersheba
Springvale
Hatlebeste
Witte Bergen
Woodsville Mt
Matatiele
Clydesdale
Ingeme Hill
Mgine Hill
Excopo


VREDE
Charlestown
Laings Nek
Luneberg
P. Pieters Dorp
Sambana
Pongola
MAJUBA
INKWELOANE
Slang
POGWANI
M. Prospect
ELMAGIDELA
ELOYA
DUMBI
HLANGWENI
Dingaan's Tree
Umsolana
AMABANDWI
VECHT
LEEUW
Woodside
SOTHA'S
Kwagas P.
EMSBOK HOEKS
INKWELOANE
BOTHAS PASS
BURGHERS PASS
Langverwacht
Potter's Store
Bevan
Magazine
NAGAMISA
MAGUGU
PONDWANA
UBOMBO
UMAMI
Mkusi
Ekulangeni Store
Bogonoma
USINVELI
ELANDS
Liebenbergs V.
Berg Spt
PRAM
Hoy
Newmarket
Cornelia
SIKORU
UTRECHT
SIGNAL
KRANSKOP
Inzondo
Blood R.
Blaauwbosch R.
Slang Spruit
KAMBULA
Laasdorf
Ft Nys
Tchidi
INTENDERA
HLOBANI
INYANI
NGOME
Ngome Forest
MBUZI
HLOPEKULU
NYONGWANA
UMBA
BAMBOLA
NEWCASTLE
3908
Incandu
TLNDEGA
CONFERENCE H.
MULLERS PASS
TAFEL
Wagenmakers V.
Korrugsberg
VERREKYKERS
LEO
Ndley
Reitz
Majoors Drift
Springfield
Schoonrietfontein
Eland's R.
Klein Spruit
SUNDAY R.
Pt ADENDORF
EMBOCHENI
Danhauser
INYAKATWA
MELANI
RHEEBOK
IMPUSHINI
IMPATI
NKANDI
VRYHEID
BEMBAS
Bolti
MUNHLA
Insegeni
Leeuw Nek
Tintas
EMPEMBENI
KEZA
NDOMI
NONGOMA
Umsinduzi
EOMI
NHLWATI
Umvoloosi
Madlethe
Zulu
Zedent
Usutu
Siwedu
Chingwayo
Ihlanyan
Esibleng
Ketwayo
BETHLEHEM
Palmiet F.
Elands Rbt
Albert Falls
Vlei
HARRISMITH
PLATBERG
Reegens
Brakwal
Colworth
Bester's
Walkers Hoek
Sond
Dewdrop
Acton Homes
Bethany
Tugela
ZWARTS
Springfield
DOORN
Zwickles
Hoffenthal
Emmaus
Berlin
Ehnersdale
Ulundi
Willow Grange
TABLE MT.
Bushmans
Moor
Cheveley
Frere
WEENEN
Colenso
SHEBA'S BREASTS
Pakadis
Keates Dr.
Itembeni
ALLARD
Ferry
Ehlanzeni
OPIBWENI
Overtoun
Tugela
Ntabamhlope
Nobilo
Ft Yolland
Louws
Mid Dr.
Entumeni
Ft Chater
Ft Montgomery
Ft Curtis
INGOYE
Umlalazi
Lower
Ft Argyle
Port Durnford
Ft Napoleon
Ft Chelmsford
Ft Grealock
Tenedos
Bonds Dr.
Andrew
Mashwell Dr.
Tollmere Dr.
Otimati
ISIBUYAZI
INDULINDI
Tugela
SPIDENK
Hermansburg
ELANDS
Dingle Dell
Angabantu Dr.
BIWASA-MANGI
Amatikulu
ESHOWE
Estcourt
DODOCI
UMKOLUMBA
RIVER
Ladysmith
Nelthorpe
KANKANA
Pieters
UMGWENDU
Allenholm
UMSINGA
Colleshie
Ekamba
Pomeroy
Douglas
Sandanezi
JOB'S
SIMBULWANA
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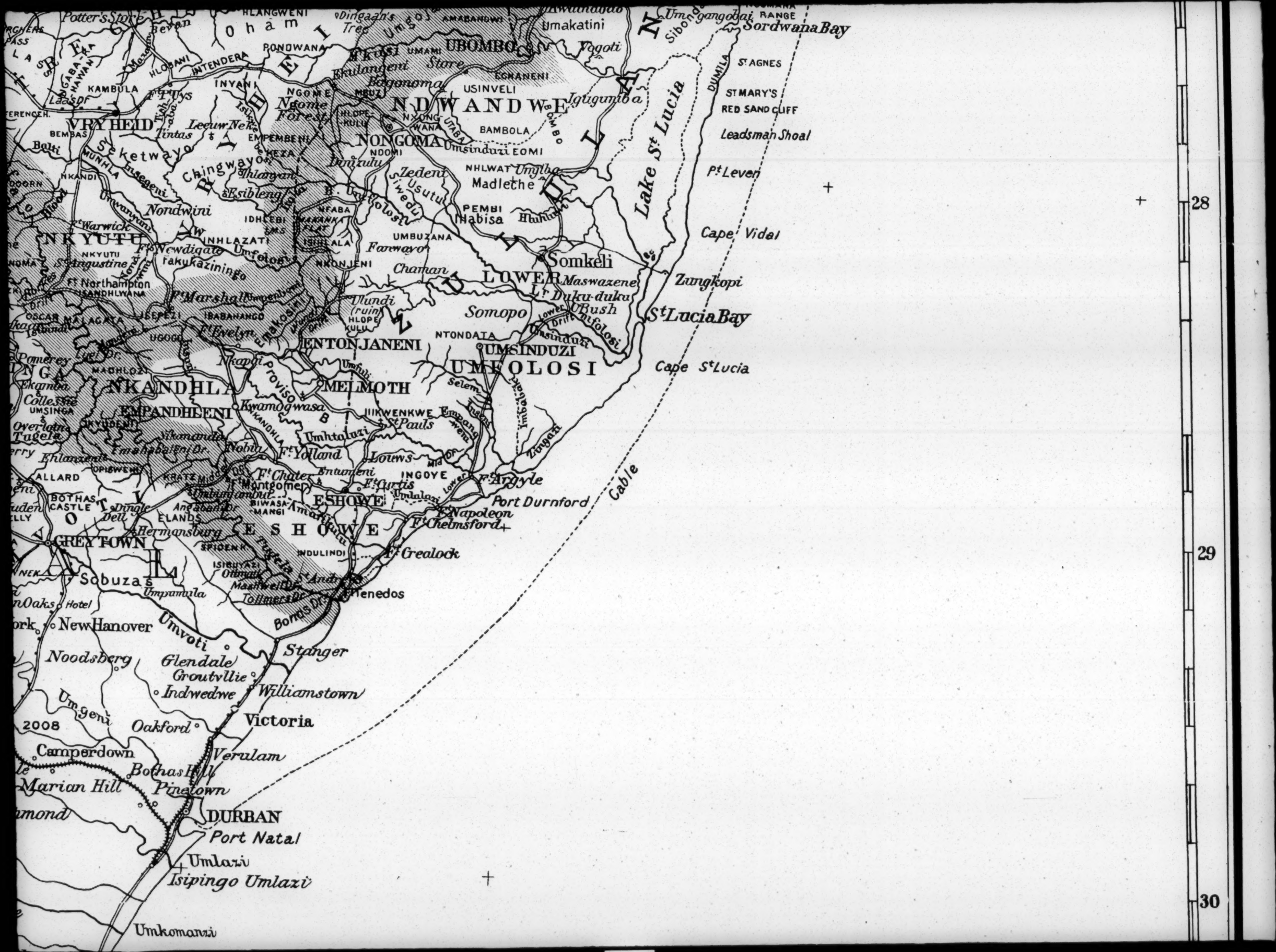
MACHLOZI
Kwamagwasa
Umhlatazi
Ikanandla
Emahabeni Dr.


Potter's Store
HLANGWENI
Dingaan's Tree
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Umakatini
Sordwana Bay
RANGE
PONDWANA
UBOMBO
Vagoti
MKUSI
UMAMI
Ekulangeni Store
EGHANENI
Bagonoma
USINVELI
Igugumboa
INTENDERA
KAMBULA
INYANI
NGOME
Ngome Forest
NDWANDWE
ST AGNES
ST MARY'S
RED SAND CLIFF
Leadsman Shoal
VRYHEID
Lecuw Neke
Tintas
EMPEMBENI
NONGOMA
BAMBOLA
Umsinduzi
EOMI
NDOMI
Umyiba
NHLWAT
Madlethe
Pt Leven
Zulu
Zedeni
Usutu
Siwedu
PEMBI
Habisa
Hluhluwe
Lake St Lucia
Nondwini
IDHLEBI
NKANDI
Warwick
NKYUTU
INHLAZATI
UMBUZANA
Farwayo
Somkeli
Cape Vidal
St Augustine
Newdigate
Umfolosi
NKONJENI
Chaman
LOWER
Maswazene
Zungkopi
Ft Northampton
ISANDHLWANA
Ft Marshall
Ulundi (ruin)
Somopo
UBush
St Lucia Bay
OSCAR MALAGAZA
ISEPEZI
IBABANANGO
Ft Evelyn
UGOGO
NTONDAIA
ENTONJANENI
UMSINDUZI
UMFOLOSI
Cape St Lucia
MAGHLOZI
NKANDHLA
MELMOTH
Nkandi
Proviso
Selem
EMPANDHLENI
Kwamagwasa
IIKWENKWE
St Pauls
Umhtaluzi
Ft Yolland
Louws
Ft Chater
Ft Montgomery
Entumeni
INGOYE
Ft Curtis
Ft Argyle
ESHOWE
Port Durnford
Ft Napoleon
Ft Chelmsford
Ft Grealock
GREYTOWN
Hermansburg
Sobuzas
Umpamula
Tugela
Mthonjaneni
Nobilo
Ft Yolland
Ft Chater
Ft Montgomery
Ft Curtis
Ft Argyle
Port Durnford
Ft Napoleon
Ft Chelmsford
Ft Grealock
Tenedos
New Hanover
Umvoti
Stanger
Noodsberg
Glendale
Groutville
Indwedwe
Williamstown
Victoria
Umgeni
Oakford
Camperdown
Verulam
Bothas Hill
Marian Hill
Pinetown
DURBAN
Port Natal
Umlazi
Isipingo Umlazi
Umkomanzi
Cable
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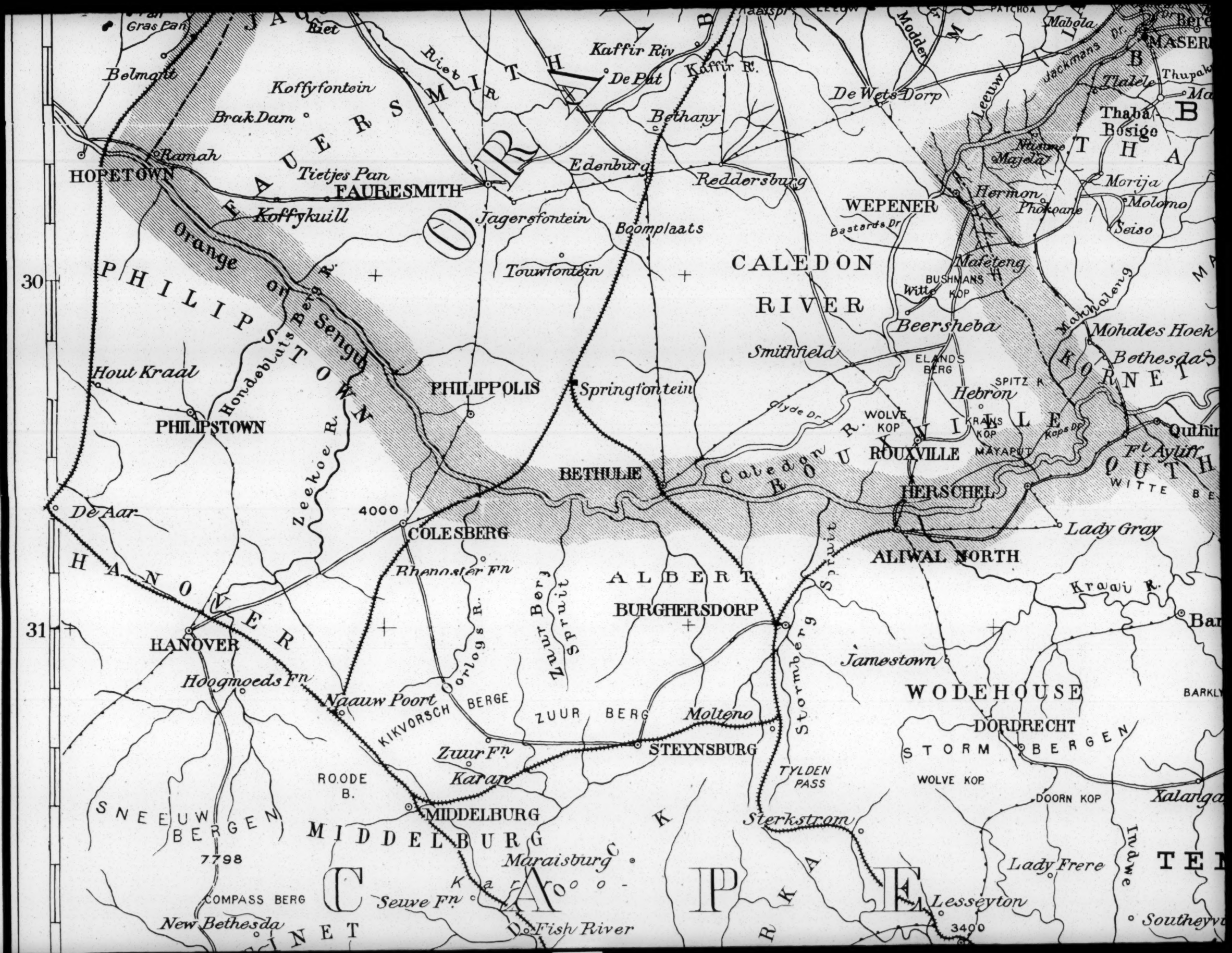

Gras Pan
Riet
Belmont
Koffyfontein
Brak Dam
Ramah
HOPETOWN
Tietjes Pan
FAURESMITH
Koffykuill
Orange or Sengu
Riet R.
Kaffir Riv
De Pat
Kaffir R.
Bethany
Edenburg
Reddersburg
Jagersfontein
Boomplaats
Touwfontein
PHILIPSTOWN
Hondeblats Berg R.
Hout Kraal
PHILIPPOLIS
Springfontein
Zeekoe R.
De Aar
4000
COLESBERG
Rhenoster Fn
Oorlogs R.
Zuur Berg Spruit
ALBERT
BURGHERSDORP
HANOVER
Hoogmoeds Fn
Naauw Poort
KIKVORSCH BERGE
ZUUR BERG
Molteno
STEYNSBURG
Zuur Fn
Karan
ROODE B.
MIDDELBURG
SNEEUW BERGEN
7798
COMPASS BERG
New Bethesda
Seuve Fn
Fish River
Maraisburg
Karroo
CAPE
Stormberg Spruit
TYLDEN PASS
Sterkstrom
Jamestown
WODEHOUSE
DORDRECHT
STORM BERGEN
WOLVE KOP
DOORN KOP
Lady Frere
Lesseyton
3400
Indwe
Southeyville
Xalanga
Kraai R.
Lady Gray
ALIWAL NORTH
HERSCHEL
ROUXVILLE
Caledon R.
WOLVE KOP
KRANS KOP
MAYAPUT
Kops Dr
Hebron
SPITZ R.
ELANDS BERG
Smithfield
Beersheba
Witte
BUSHMANS KOP
Mafeteng
CALEDON RIVER
Bastards Dr
WEPENER
Hermon
Phokoane
Majela
Nasume
Leeuw
De Wets Dorp
Modder
Jackmans Dr.
Mabola
Thaba Bosige
Morija
Molomo
Seiso
Makhaleng
Mohales Hoek
Bethesda
Ft. Ayliff
Quthing
WITTE BE
Thupak
Tlalele
MASERE
Bere
30
31

THABANCHU
RAPUIS
PATCHOA
LEEUW
Modder
Mabola
Caffraria
Berea
Pitute
Mapshuane
Mothebetswane
SEFIKENG
MASERU
DIPETUNG NEK
Semene
Matsu
Kabentau
BUSHMANS RIV. PASS
Mobi River
Weston
Midleton
Mooi
MT WEST 5979
MT GILBO
Lidg
Nottingham
Howick
Giants Castle 9656
6482
INHLUZAN
PIETERMARITZBURG
Ellendale
Byrne Th
Jackmans Dr.
Thupakubu
Tlalele
Masupha
MACHACHA 10980
Mphaka
Lekuni
Monmphdi
Ledingwana
Mokhothlong
Leeuw
De Wets Dorp
Thaba Bosigo
BASUTO
Ntsane
Majela
Morija
Molomo
Seiso
Hermon
Phokoane
WEPENER
Bastards Dr
THABA MTS.
MALUTI
M'Kwali
Bushmans Nek
Tlakanelo
Ipolela
Indaleni
Impendhle
Seleso
Mokoko
Motlokolo
Senkunyane
Orange (Senqu)
QUATHLAMBA
Mafeteng
BUSHMANS KOP
Witte
Makhaleng
Mohales Hoek
Bethesda
KORNET SPRUIT
Malebajane
Beersheba
Smithfield
ELANDS BERG
SPITZ R.
Hebron
WOLVE KOP
KRANS KOP
MAYAPUT
Kaps Dp
ROUXVILLE
HERSCHEL
Quthing
Ft. Aylff
WITTE BERGEN
QUTHING
Bersheba
Springvale
Hatlebeeste
WITTE BERGEN
Woodsville
MT CURRIE
Matatiele
Ingeme Hill
Clydesdale
(Umzimkulu)
McKelo
Mqing Hill
Excpo
GRIQUALAND EAST
KOKSTAD
Riel Vley
Harding
Ebenezer
Alfred
Elim
Lady Gray
ALIWAL NORTH
Mt. Fletcher
Mt. Frere
Mt. Ayliff
Tina
Umzimvubu
Rode
Olungwana
Imgodini
Umtentu
Umsikaba
Waterfall Bluff
Ft. Harris
Umzimvubu (St. Johns R.)
Kraai R.
NEWTON PK.
Barkly East
BARKLY PK.
PONDO PASS
Maclear
Ugie
Qumba
Shawbury
St. Augustine
Palmerton
Tsolo
Jamestown
WODEHOUSE
DORDRECHT
STORM BERGEN
Stormberg
Orange
Xalanga
Maxongos Hoek
Umtata
Buntingville
PONDOLAND
TYLDEN PASS
WOLVE KOP
DOORN KOP
Sterkstrom
Lady Frere
Indwe
Clarksbury
Lesseyton
TEMBULAND
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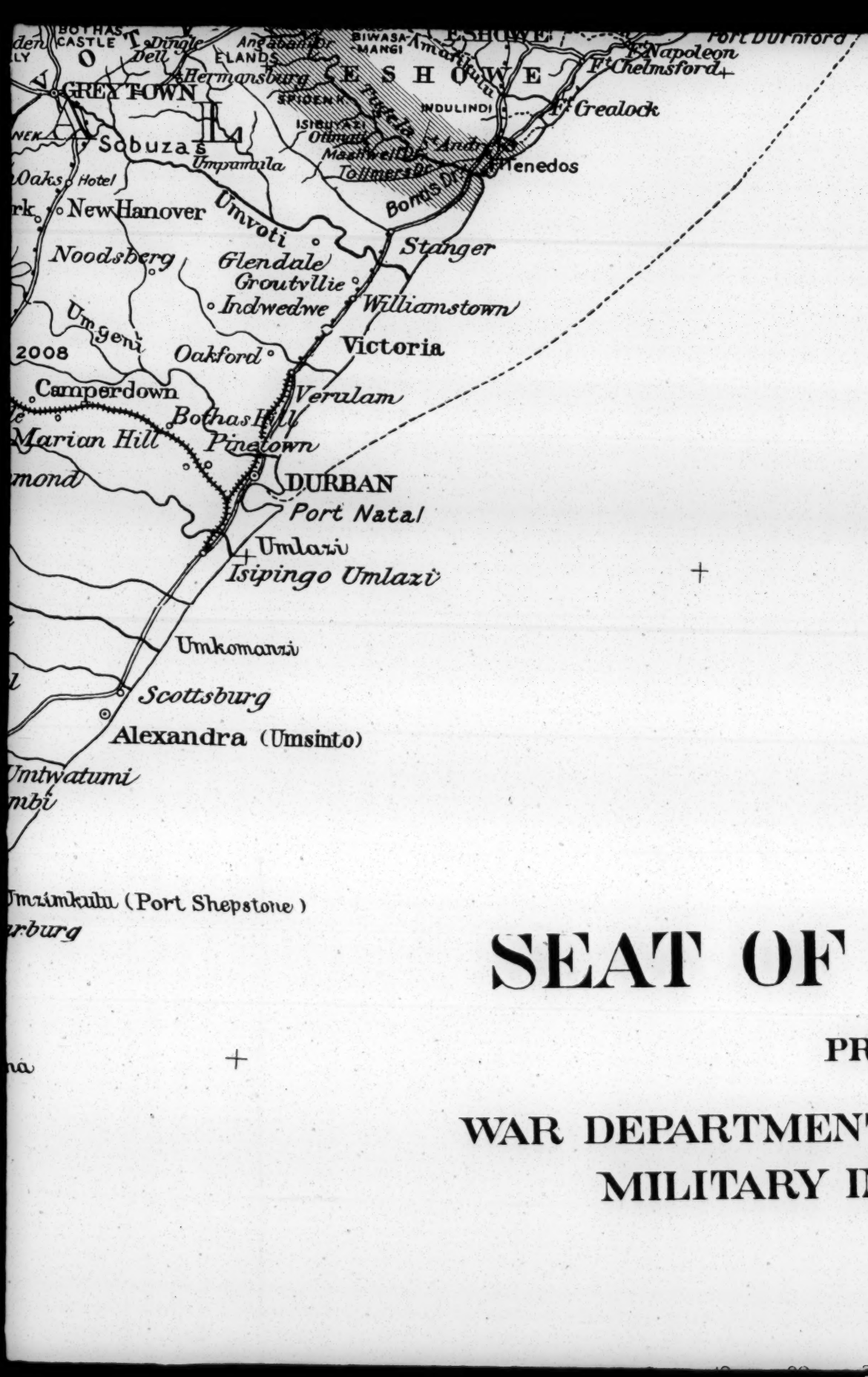
SEAT OF WA

PREPARED

WAR DEPARTMENT, ADJU
MILITARY INFORMA

189

Emmaus
Berlin
Ennersdale
Estcourt
KeatesDr.
Itembeni
ALLARD
UMKOLUMBA
DODOCI
Muden
KELLY
BOTHAS CASTLE
Dingle Dell
ERNESHINA
GREYTOWN
Hermansburg
ELANDS
Angabandor
BIWASA-MANGI
Amanzimtoti
ESHOWE
Port Durnford
Napoleon
Ft Chelmsford
Ft Grealock
INDULINDI
Ft Curtis
Umlalazi
Ft Argyle
Ft Chater
Ft Montgomery
Entumeni
INGOYE
CATHKIN PK 9560
Location
Ulundi
Willow Grange
TABLE MT
Mooi
RIVER
Senba
OLD BUSHMANS PASS
Matsuka
Kabentar
GRAVS P.
Bushmans
HLATIKULU
Bushmans
Forest
Midleton
BUSHMANS RIV. PASS
Mobi River
Mooi
Weston
MT WEST 5979
MT GILBOA
POMPOENNEK
Sobuza's
Umpamula
ISIBUYAZI
Otimati
Mashwelpeni
Tollmerspr
St Andrews
Fenedos
Bonas Dr
SpioenK
Rugeta
Pietvlei
Seven Oaks
Hotel
York
New Hanover
Umvoti
Stanger
Glendale
Groutville
Indwedwe
Williamstown
Victoria
Verulam
Mphaka
Lekuni
edingwana
Monmphalli
Giants Castle
9856
6482
INHLUZAN
Nottingham
Lidgettown
Howick
Noodsberg
Umgeni
Oakford
PIETERMARITZBURG
2008
Ellendale
Camperdown
Georgedale
Marian Hill
Byrne Tn
Bothas Hill
Pinetown
DURBAN
Port Natal
Umlazi
Isipingo Umlazi
Mokhothlong
M'Kwali
Bushmans Nek
Ipolela
Impendhle
Indaleni
Richmond
Umkomanzi
Springvale
St Michael
Scottsburg
Alexandra (Umsinto)
Umtwatumi
Umzumbi
Umzimkulu (Port Shepstone)
Marburg
Ebenezer
Alfred
Elim
Umtamvuna
Imgodini
Ohungwana
Rode
Mt Frere
Mt Ayliff
Umzimvubu
KOKSTAD
Riel Vley
Harding
Umtentu
Umsikaba
Waterfall Bluff
Palmerton
Shawbury
Qumba
Tsolo
Matatiele
WITTE BERGEN
Woodsville
MT CURRIE
Inepene Hill
Clydesdale
(Umzimkulu)
Bersheba
Springvale
Hatleberste
Mc Kelvie
Mgine Hill
Excpo
Cable
RIBEE
QUATHLAMBA
BASUTOLAND
EAST
QUALAND



MAP

OF THE

SEAT OF WAR IN AFRICA

PREPARED IN THE

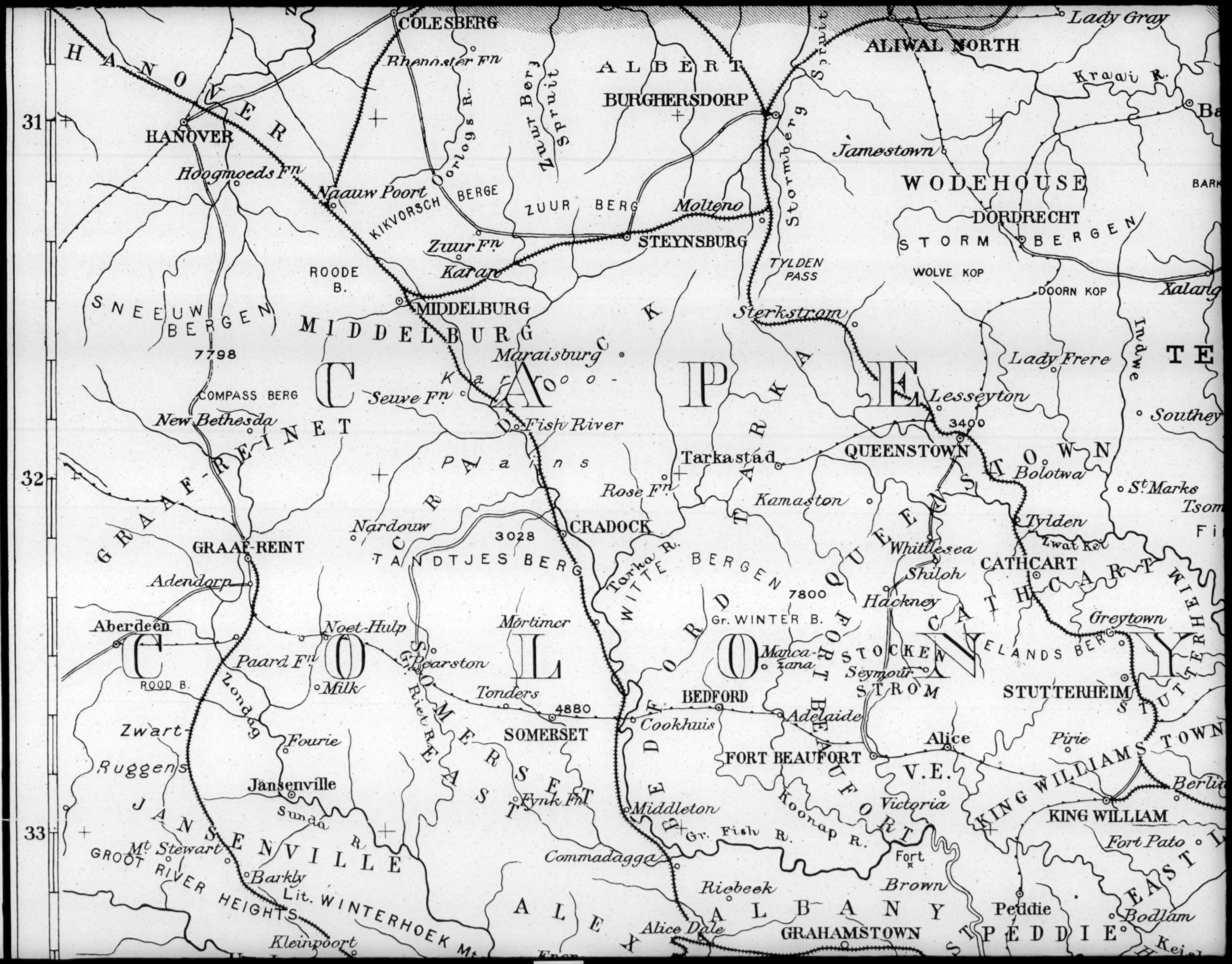
WAR DEPARTMENT, ADJUTANT GENERAL'S OFFICE, MILITARY INFORMATION DIVISION,

1899.

SCALE:

10 20 30 40 50 60 70 80 90 100 MILES.

XUM



COLESBERG
Rhenoster Fn
HANOVER
Hoogmoeds Fn
Naauw Poort
KIKVORSCH BERGE
Oorlogs R.
Zuur Berg Spruit
ALBERT
BURGHERSDORP
Stormberg Spruit
ALIWAL NORTH
Lady Gray
Kraai R.
Jamestown
WODEHOUSE
DORDRECHT
STORM BERGEN
Molteno
STEYNSBURG
ZUUR BERG
Zuur Fn
Karan
ROODE B.
MIDDELBURG
SNEEUW BERGEN
7798
COMPASS BERG
New Bethesda
GRAAF-REINET
Maraisburg
Karroo-
Seuve Fn
Fish River
Plains
CRADOCK
Rose Fn
Tarkastad
Kamaston
TYLDEN PASS
Sterkstrom
WOLVE KOP
DOORN KOP
Xalang
Lady Frere
Indwe
Lesseyton
3400
QUEENSTOWN
Bolotwa
Southey
St Marks
Tsom
Tylden
Zwat Kei
CATHCART
Whittlesea
Shiloh
Hackney
Greytown
Nardouw
3028
TANDTJES BERG
GRAAF-REINT
Adendorp
Aberdeen
Noet-Hulp
Paard Fn
Milk
ROOD B.
Zondag
Pearston
Mortimer
Tonders
4880
SOMERSET
Gr. Riet R.
Zwart-Ruggens
Fourie
Jansenville
Sunda R.
JANSENVILLE
Mt Stewart
GROOT RIVER HEIGHTS
Barkly
Lit. WINTERHOEK Mt
Kleinpoort
Tarka R.
WITTE BERGEN
7800
Gr. WINTER B.
Manca-zana
BEDFORD
Cookhuis
Adelaide
FORT BEAUFORT
Alice
Victoria
Koonap R.
Gr. Fish R.
Middleton
Commadagga
Riebeek
Alice Dale
ALBANY
GRAHAMSTOWN
Fort Brown
Peddie
PEDDIE
Bodlam
Fort Pato
KING WILLIAMS TOWN
KING WILLIAM
STUTTERHEIM
STOCKEN STROM
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CATHCART
BARK
TE
CAPE
COLONY
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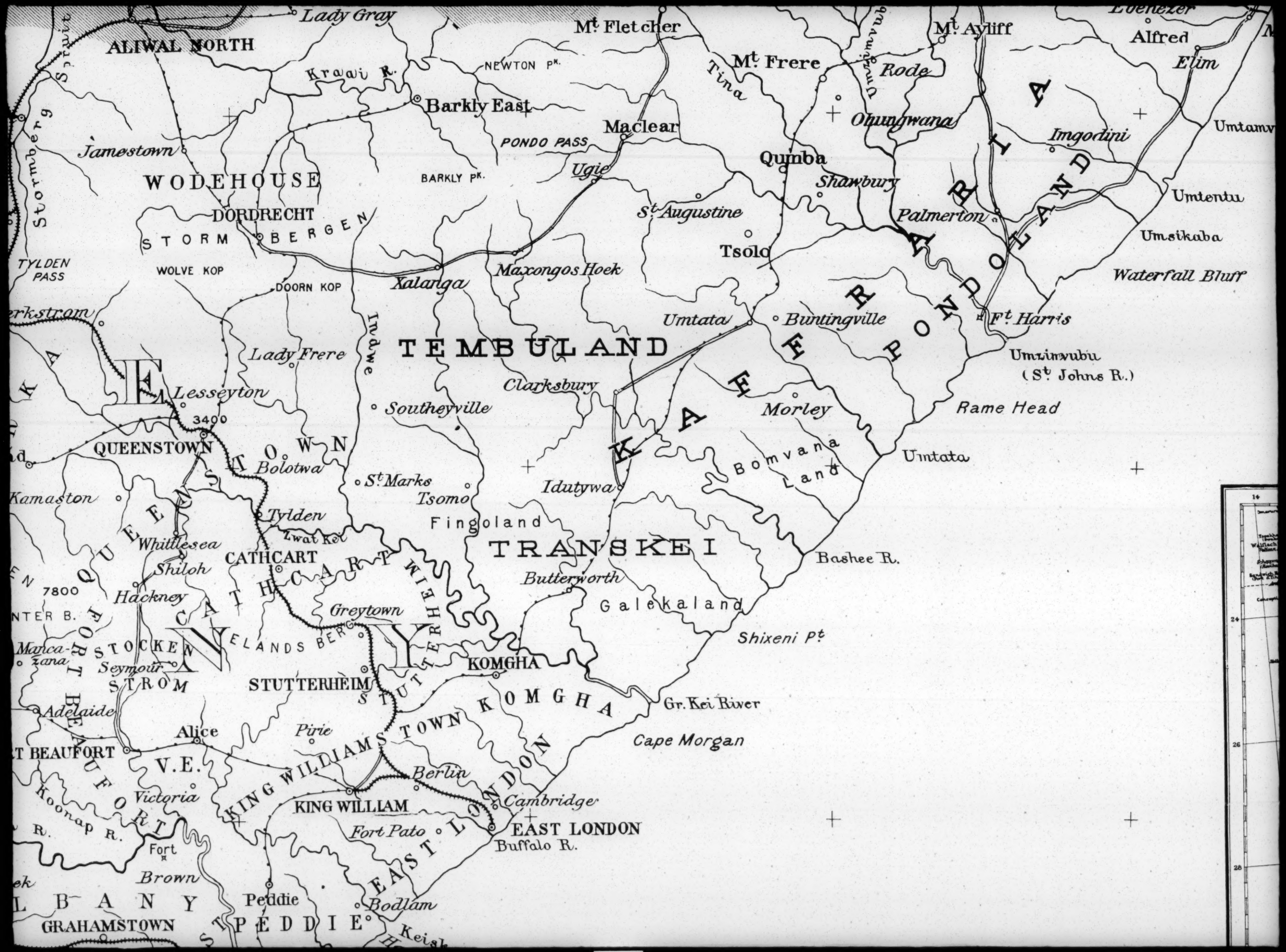

Lady Gray
ALIWAL NORTH
Mt. Fletcher
Mt. Ayliff
Alfred
Elim
Mt. Frere
Rode
Tina
Umzimvubu
Kraai R.
NEWTON PK.
Barkly East
Maclear
PONDO PASS
Ohungwana
Imgodini
Umtamvu
Jamestown
WODEHOUSE
BARKLY PK.
Ugie
Qumba
Shawbury
Umtentu
DORDRECHT
STORM BERGEN
St. Augustine
Palmerton
Umsikaba
Tsolo
TYLDEN PASS
WOLVE KOP
DOORN KOP
Xalanga
Maxongos Hoek
Waterfall Bluff
Umtata
Buntingville
Ft. Harris
Indwe
TEMBULAND
Lady Frere
Umzimvubu (St. Johns R.)
Lesseyton
Clarksbury
Southeyville
Morley
Rame Head
3400
QUEENSTOWN
Bolotwa
St. Marks
Tsomo
Idutywa
Bomvana Land
Umtata
Kamaston
Tylden
Fingoland
Zwat Kei
Whittlesea
CATHCART
TRANSKEI
Bashee R.
Shiloh
Butterworth
7800
Hackney
Greytown
Galekaland
Shixeni Pt.
Manca-zana
STOCKEN
Seymour
STROM
STUTTERHEIM
KOMGHA
Gr. Kei River
Adelaide
Alice
Pirie
Cape Morgan
T BEAUFORT
V.E.
KING WILLIAMSTOWN
Berlin
Victoria
KING WILLIAM
Cambridge
Koonap R.
Fort Pato
EAST LONDON
Buffalo R.
Fort Brown
Peddie
Bodlam
GRAHAMSTOWN
PEDDIE
Keisk
Stormberg
Spruit
Tyrkstrom
Umzimvubu
Umtamvu
Umtentu
Umsikaba
Waterfall Bluff
Rame Head
Bashee R.
Shixeni Pt.
Gr. Kei River
Cape Morgan
Cambridge
Buffalo R.
Keisk

Ebenezer
Umzimkulu (Port Shepstone)
Mt. Ayliff
Alfred
Marburg
Frere
Rode
Elim
Umzimvubu
Ohungwana
Imgodini
Umtamvuna
Qumba
Shawbury
Umtentu
Palmerton
Umsikaba
Waterfall Bluff
Buntingville
Ft. Harris
Umzimvubu
(St. Johns R.)
Morley
Rame Head
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Bashee R.
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SEAT OF WAR

PREPARED IN T

WAR DEPARTMENT, ADJUTAN
MILITARY INFORMATIC

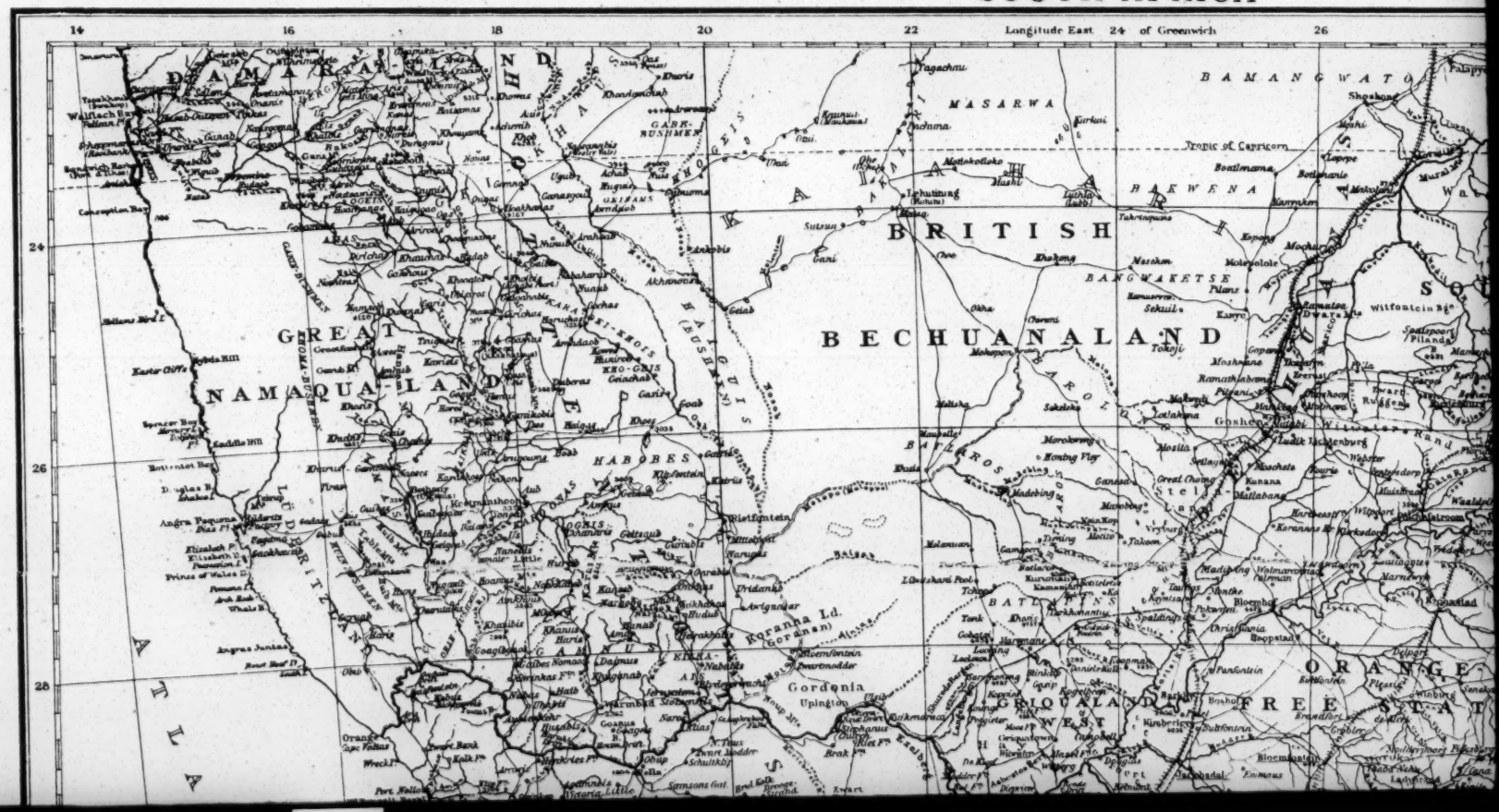
1899.

SCALE:

10 0 10 20 30 40 50 60

REPRINT

SOUTH AFRICA



XIUM

Umzimkulu (Port Shepstone)
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OF THE

SEAT OF WAR IN AFRICA

PREPARED IN THE

WAR DEPARTMENT, ADJUTANT GENERAL'S OFFICE, MILITARY INFORMATION DIVISION,

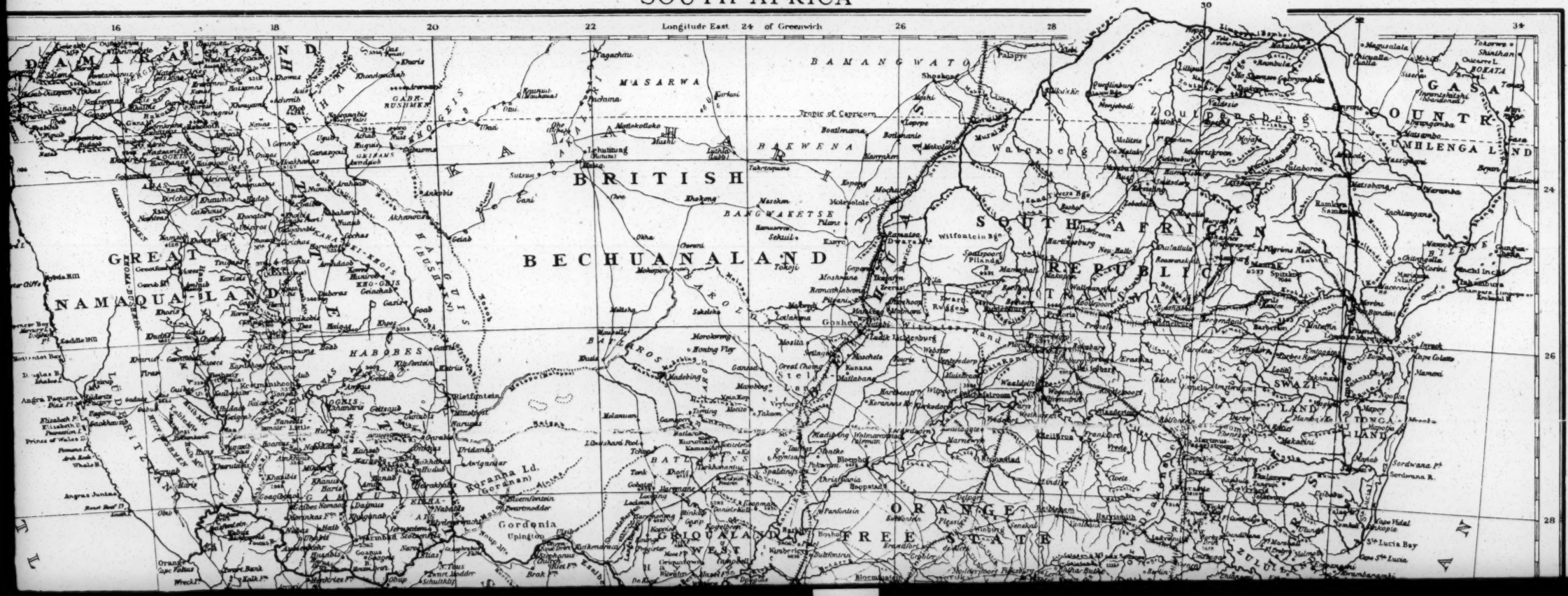
1899.

SCALE:

10 0 10 20 30 40 50 60 70 80 90 100 MILES.

REPRINT

SOUTH AFRICA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Longitude East of Greenwich
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Tropic of Capricorn
DAMARA-LAND
GREAT NAMAQUA-LAND
GRIQUALAND WEST
BECHUANALAND
BRITISH
BAMANGWATO
MASARWA
BAKWENA
BANGWAKETSE
BATLAPINS
BAROLONG
HABOBES
KORANNA
GORDONIA
Koranna Ld. (Gordman)
Gordonia
Upington
Griquastad
Kuruman
Taungs
Vryburg
Mafeking
Zeerust
Rustenburg
Pretoria
Johannesburg
Potchefstroom
Klerksdorp
Heidelberg
Standerton
Wolmaransstad
Bloemhof
Christiania
Boshof
Kimberley
Barkly West
Hopetown
Prieska
Douglas
Griquastad West
Orange Free State
South African Republic
Transvaal
Witfontein Bge
Witwatersrand
Rand
Lydenburg
Middelburg
Waterberg
Zoutpansberg
Swaziland
Tongaland
Umhlenga Land
Gasa Country
Zululand
Amatongaland
Delagoa Bay
Lourenco Marques
Sordwana Pt
Sordwana R.
St Lucia Bay
Cape St Lucia
Cape Vidal
Kosi
Angra Pequena
Elizabeth P.
Prince of Wales P.
Angra Juntas
Port Nolloth
Orange R.
Cape Frio
Walvisch Bay
Swakop R.
Omaruru
Otjimbingue
Windhuk
Rehoboth
Gobabis
Grootfontein
Otavi
Tsumeb
Ngami L.
Lake Ngami
Victoria Falls
Zambesi R.
Chobe R.
Linyanti R.
Sesheke
Palapye
Shoshong
Mochudi
Kanye
Molopolole
Gaberones
Lobatsi
Mafeking
Ramathlabama
Setlagoli
Mosita
Lichtenburg
Ventersdorp
Potchefstroom
Klerksdorp
Wolmaransstad
Bloemhof
Christiania
Boshof
Kimberley
Barkly West
Hopetown
Prieska
Douglas
Griquastad West
Vryburg
Taungs
Kuruman
Mafeking
Zeerust
Rustenburg
Pretoria
Johannesburg
Heidelberg
Standerton
Middelburg
Lydenburg
Waterberg
Zoutpansberg
Swaziland
Tongaland
Umhlenga Land
Gasa Country
Zululand
Amatongaland
Delagoa Bay
Lourenco Marques
Sordwana Pt
Sordwana R.
St Lucia Bay
Cape St Lucia
Cape Vidal
Kosi
Angra Pequena
Elizabeth P.
Prince of Wales P.
Angra Juntas
Port Nolloth
Orange R.
Cape Frio
Walvisch Bay
Swakop R.
Omaruru
Otjimbingue
Windhuk
Rehoboth
Gobabis
Grootfontein
Otavi
Tsumeb
Ngami L.
Lake Ngami
Victoria Falls
Zambesi R.
Chobe R.
Linyanti R.
Sesheke
Palapye
Shoshong
Mochudi
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Gaberones
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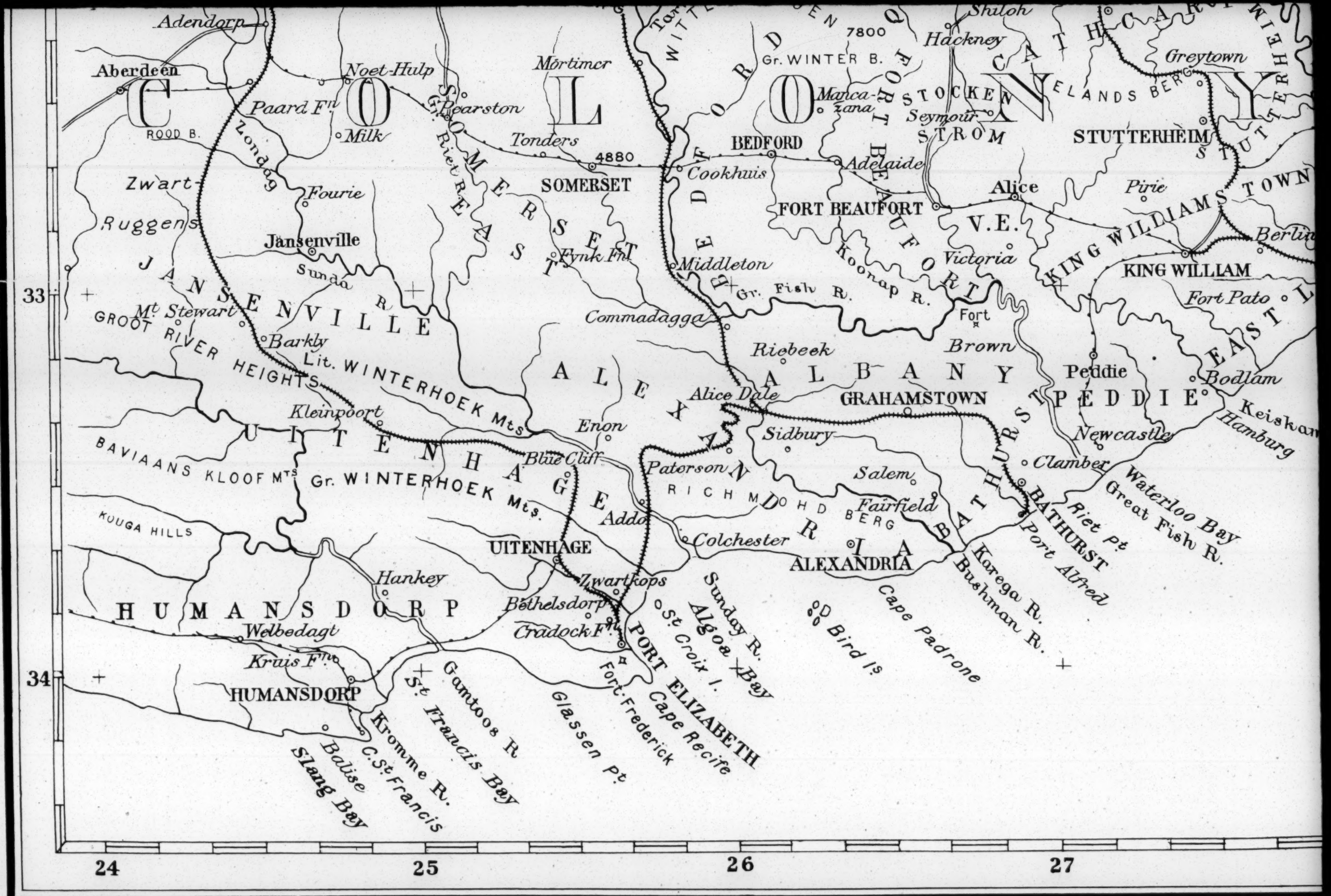

SUPPLEMENT TO THE NATIO

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Greytown

Galekaland

Shixeni Pt

Manca-
zana

STOCKEN

Seymour

STROM

STUTTERHEIM

KOMGHA

Adelaide

Alice

Pirie

Gr. Kei River

Cape Morgan

BEAUFORT

V.E.

Victoria

Berlin

Koonap R.

KING WILLIAM

Cambridge

Fort Pato

EAST LONDON

Buffalo R.

Fort

Brown

Peddie

Bodlam

GRAHAMSTOWN

Newcastle

Keiskamma
Hamburg

Salem

Clumber

Waterloo Bay

Great Fish R.

Fairfield

BERG

BATHURST

Riet Pt

Port Alfred

Kareega R.

Bushman R.

Cape Padrone

Bird Is.

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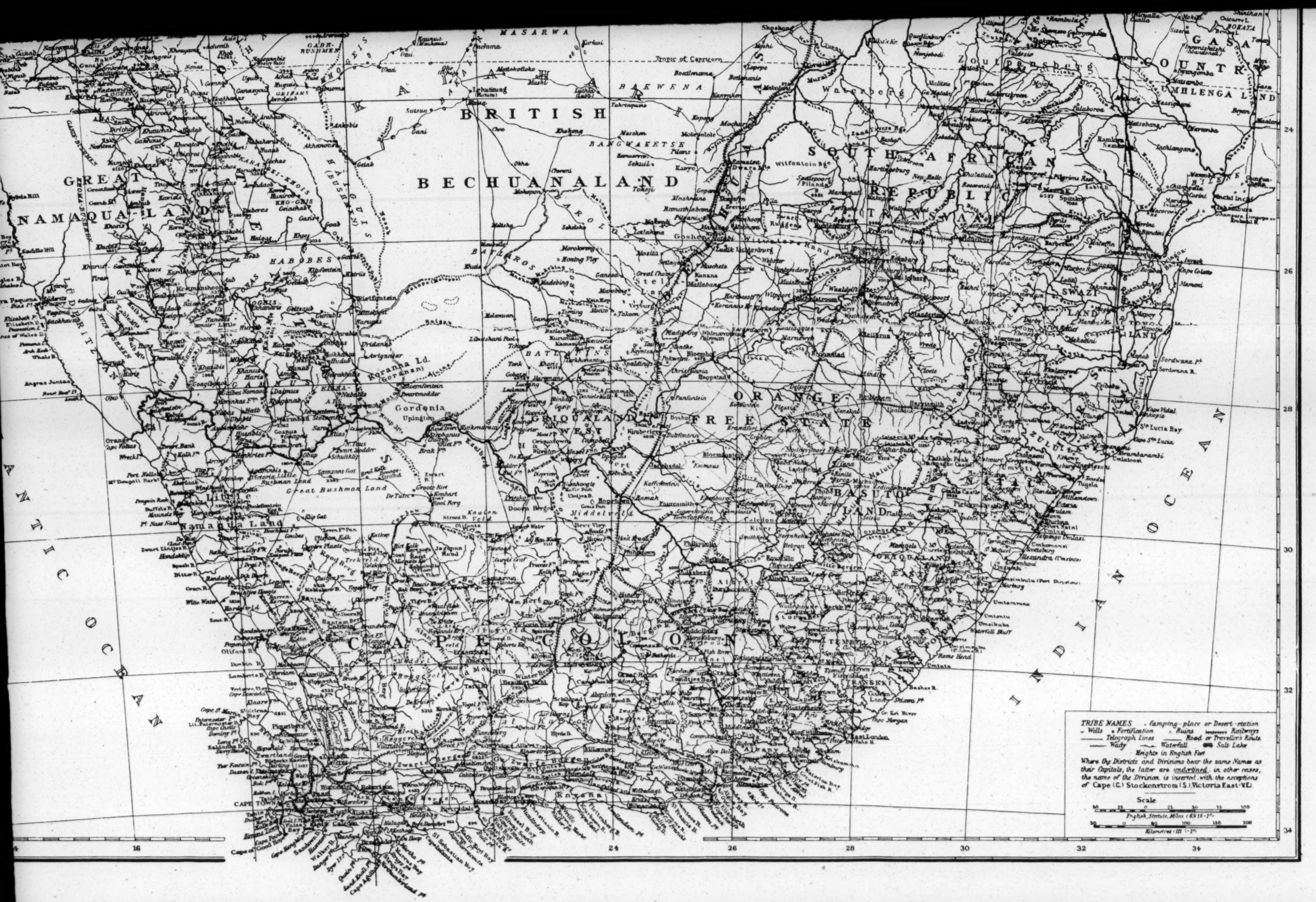

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XUM

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THE WELLMAN POLAR EXPEDITION

By WALTER WELLMAN

The Wellman Polar Expedition of 1898–'99 had two purposes in view. One of these was to finish the exploration of Franz Josef Land, and the other was to make an approach, by means of what is known as "a dash," near or to the North Pole. Incidentally to both these efforts scientific work of the usual character was to be carried on by a competent corps of observers. The expedition was aided in a financial way by the National Geographic Society, by President Jesup of the American Museum of Natural History, by President McKinley, Secretary of State Hay, J. Pierpont Morgan, W. K. Vanderbilt, William C. Whitney, Richard Olney, and other well-known public men. The cost of the expedition was about $27,000, of which sum $12,000 was subscribed by the various contributors.

June 26, 1898, the expedition sailed from Tromsö, Norway, in the ice-steamer *Frithjof*. Aboard were nine members of the expeditionary party—four Americans and five Norwegians. Prof. James H. Gore, of Washington, who had planned to accompany the expedition to Franz Josef Land for a summer's work in geodesy, was unable to go beyond Tromsö on account of the danger that the ship might not get back in time to enable him to meet imperative engagements. Calling at Archangel, Russia, the *Frithjof* took aboard a pack of 83 Siberian dogs which had been brought from the Ob river by Alexander Trontheim, a trustworthy Russian, who has now supplied three Arctic expeditions with draught dogs purchased from the Ostiak tribes. In order to deliver his pack according to contract, Trontheim had to make

a 2,000-mile journey over the Ural mountains, across the plains and tundra, fording swollen rivers and wading deep swamps. Material for house-building was also taken on at Archangel, and the *Frithjof* then steamed northward. The pack-ice was met at about the 77th parallel of latitude July 9, and three days later, the supply of coal running short, it was deemed prudent to run back to Norway for more fuel. July 20 the ship was again at the ice edge, and after a week of ramming through loose floes and searching for open leads found a clear waterway, in which such rapid progress was made that the ice-capped mountains of Franz Josef Land were visible from the crow's-nest July 27.

Next day the *Frithjof* was at Cape Flora, which for three years had been the headquarters of the Jackson-Harmsworth (English) expedition, and where Nansen and Jackson had had their memorable meeting in June, 1896, a chance encounter which doubtless saved the lives of the Norwegian explorer and his comrade. It had been the first plan of our expedition to make Cape Flora our winter quarters, and we had secured from Mr Harmsworth the privilege of making such use as we wished of the house and stores there. It appearing that there was a possibility of pushing our winter quarters farther north and east, we took aboard one of the collapsible houses, which had been used at Cape Flora for storage purposes, and steamed away to the eastward.

At Cape Flora we had hoped to find Andrée and the members of his balloon expedition, which had left Danes island, Spitzbergen, a year before; but finding neither Andrée nor any tidings of him, we were forced to the sad conclusion, which time has since confirmed, that the brave Swede and his comrades lost their lives by a descent of their air-ship into the waters of the Barents sea, east of Spitzbergen and south of Franz Josef Land, probably within 10 or 15 days after their ascension.

After making an unsuccessful effort to push our ship north through the ice-clad British channel, which had been explored by Jackson and down which Nansen had come in his retreat from his winter hut, we moved eastward along the south coast as far as Cape Tegetthoff and Salm island. Off the south shore of this island we steamed in open water over the very spot where the Austro-Hungarian ship *Tegetthoff* had been abandoned, fast in the ice, a quarter of a century before. It may be remembered that for more than a year the *Tegetthoff* had been held in the ice, having become beset off the western shores of Nova Zembla, and that she had drifted helplessly to this spot, where her crew,

through this fortunate accident, were able to discover a hitherto unknown Arctic land. Vainly endeavoring to find water through which to force the *Frithjof* still farther north along the east coast (then unexplored), and finding nothing but ice in every direction, we were compelled to return to Cape Tegetthoff, and there send our stores ashore for the purpose of establishing winter quarters. By August 3 this work was completed, and the ship sailed away for home, leaving us the only human inhabitants of Franz Josef Land, our nearest neighbors being Samoyedes and a few Russians in Nova Zembla, 500 miles to the south. Neither Franz Josef Land nor Spitzbergen is now inhabited by Eskimo or other northern tribes, and, so far as can be learned, never was occupied by any other men than Europeans there for the purposes of exploring and hunting or fishing. Spitzbergen has been known for 250 years. and is visited every summer by a considerable number of craft, but Franz Josef Land has until recently remained almost a *terra incognita*.

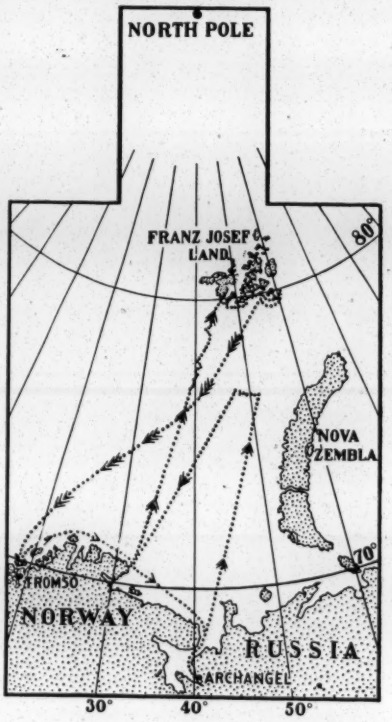

DIAGRAM SHOWING THE ROUTE OF THE FRITHJOF, 1898

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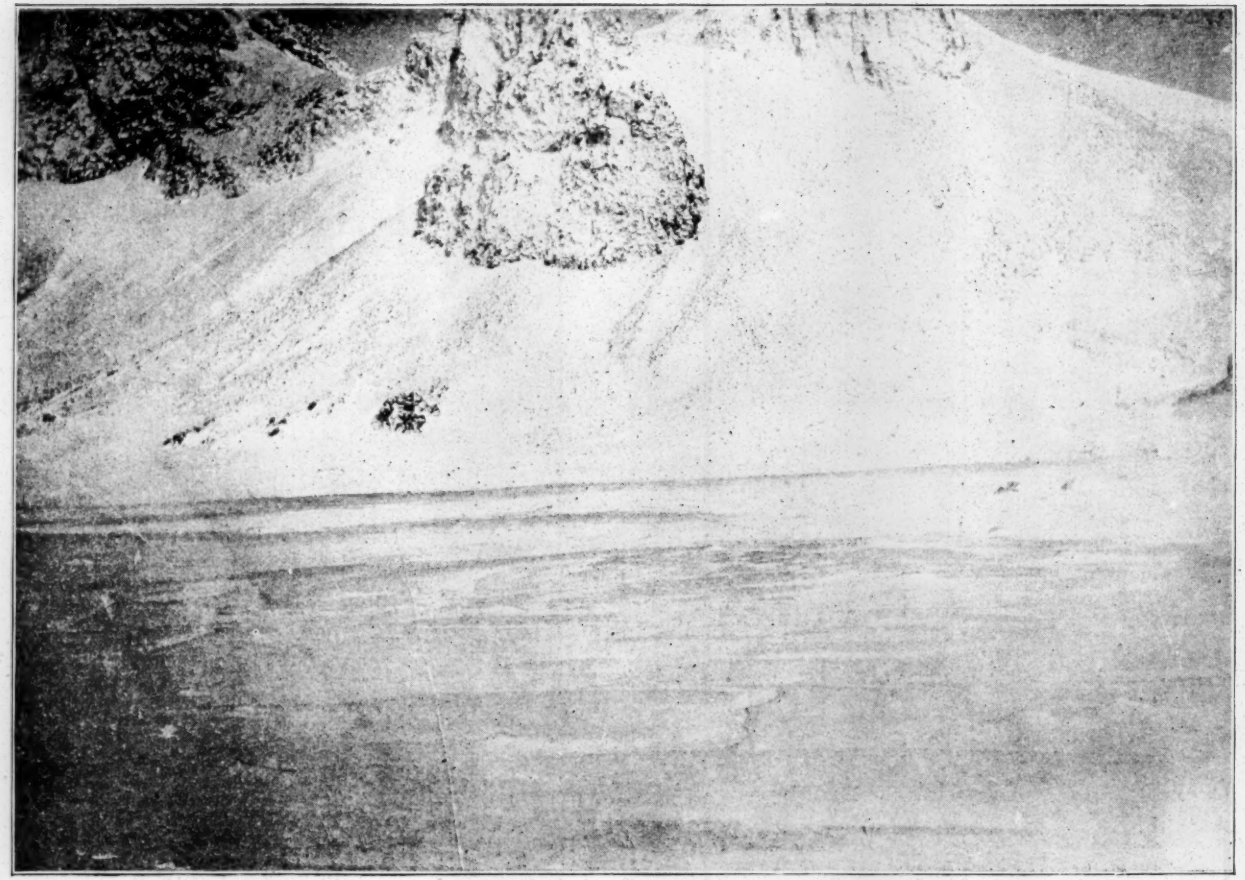
The cosmopolitanism of modern scientific exploration is nowhere better illustrated than in this region. Discovered by chance by Austro-Hungarians, it was next visited by Englishmen under the leadership of B. Leigh Smith. It was in 1882 that Mr Smith, on his second voyage to these coasts, lost his ship, the *Eira*, near Cape Flora, and was compelled to pass the long winter in an improvised hut built but a few rods from Mr Jackson's subsequent headquarters. The ruins of that hut, in which 25 men passed the winter in good health, living chiefly

upon bear and walrus meat, still remain, mute witnesses to the fact that Dr Nansen and Lieutenant Johansen were not the first explorers to show that if worst comes to worst the adventurous man, caught out for the long night, may make himself reasonably comfortable with such materials as the country affords, while his rifle keeps him from starvation.

Next came the carefully prepared Jackson-Harmsworth expedition, which explored the western and central parts of the archipelago, but did not succeed in getting farther north than a little beyond the 81st parallel. Mr Jackson, whom I esteem as a painstaking and conscientious explorer, pronounced his judgment that Franz Josef Land was not a good gateway to the Pole, being a mass of small, detached islands, instead of a continental land mass. My own opinion is quite the contrary. It is true the region is one of comparatively small lands and many islands, and in summer the straits and fiords are broken up and filled with drift-ice, which precludes, more or less, active expeditionary work; but at this season of the year not much can be done anywhere in the Arctics, and in the favorable season, to wit, the spring of the year, these fiords and straits afford the best of roadways toward the far north.

The next visitor to these lands was Dr Nansen, and he came down from the north on his return from his memorable sledge journey from the *Fram*, reaching the northeast islands at the end of the summer, and finding it necessary to winter in an improvised hut. Next spring, without knowing where he was, and imagining himself to be nearer Spitzbergen than Franz Josef Land, he renewed his journey, only to meet, by a most rare and happy chance, with the Englishmen at Cape Flora.

After the Norwegians came the Americans, ourselves, with our Norwegian comrades, and as we were coming out this summer we met going in the young Duke of Abruzzi, the Italian prince. This young scion of royalty (he is a son of a former King of Spain, Amadeus) has at great expense outfitted his expedition, and is determined, as he says, to reach the Pole or lose his life in the effort. When we met the Duke his ship, the *Stella Polare*, was in the British channel, in latitude 80° 20′, and with good prospects of pushing 20 or 30 miles farther north before stopping for the winter. Subsequently a pigeon message is reported arriving in Russia with word from the Italian explorer that he is wintering about the 81st parallel of latitude, near the site of the Nansen hut. He has, therefore, an excellent chance for doing good work



BASALT FORMATION — FRANZ JOSEF LAND

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in the way of a northerly advance next spring. He has 120 dogs, procured for him by Trontheim, and every device that ingenuity could suggest or money buy. The real test for him will come, as it comes to all who attempt the arduous road to the Pole, when he leaves his comfortable winter quarters or his ship and takes to the open field in a sledging trip during the extreme cold. Up to this time it is all comparatively easy, but sledging in February, March, and April tries men's endurance and courage to the utmost.

It is not too much to say that of all the men now in the Arctic regions the young Italian prince has the best chance to reach the Pole or to eclipse Dr Nansen's record. In my opinion, neither Peary nor Sverdrup, both of whom are wintering on the west coast of Greenland, about latitude 79°, has much chance. Their base is too far south. True, Lieutenant Peary has supplies at General Greely's house at Fort Conger upon which he may draw during his sledge journey next spring, but he must travel 150 miles to reach that outpost, and then will be but a little nearer his goal than the Italian is at his base. Besides, Mr Peary was unfortunate enough last winter to suffer the loss of seven toes, and though he is known to be a resolute man, it is questioned by all men of Arctic experience if it be possible for him, thus handicapped, to endure the tortures of a severe sledging campaign. As for Captain Sverdrup, who has so far failed in his scheme to circumnavigate Greenland in the *Fram*, it is not known precisely what he is to attempt to do.

With Peary, Sverdrup, and Abruzzi the conditions are the same in one important respect as they were with us. The effort to make the North Pole must be by a dash, and nothing but a dash. The writer admits that he was the author of the phrase, "a dash for the Pole," but he cannot claim credit as the originator of the idea. As far back as 1827, Parry, the Englishman, attempted a dash for the Pole from the shores of northern Spitzbergen, and established one of the northerly records in that constant advance toward the Pole which restless man has persisted in making. Many other dashes have been made since that time.

Why must it be a dash? Why cannot one take his time to the task, making a gradual approach, year after year? These are questions often asked. The answer is very simple. If we had land extending to or near the Pole the old theory of a gradual advance from depot to depot would hold good. Reaching the Pole would in that case be simply a question of persistent effort,

of stretching out a base of supplies, of a long campaign, or of one organized on a sufficiently large scale to enable the flying column at the front to be well supported from the rear. But the polar explorer, like the mining engineer, the railway constructor, and the colonist, must take conditions as he finds them and adapt his methods to them. There are two main avenues of approach to the Pole—one by North Greenland and the other by Franz Josef Land. These are the two lands reaching nearest to the Pole from lower latitudes, but neither extends, so far as we now know, nearer than within 450 miles of that mathematical point upon which it is the ambition of man to plant his feet.

The aim of every pole-seeker is to get his base or his outpost established as far north as possible upon the land, and to make a dash beyond that point. Thus Mr Peary planned a depot of supplies at the extreme northerly limits of Greenland, but has not as yet been able to establish it. Abruzzi is wintering at 81°, and we made our headquarters a little north of 80°, and established an outpost about 81°. The explorer may use two or three years in establishing his outposts upon the most northerly land he can employ for this purpose, but when he once leaves the land and takes to the frozen surface of the polar sea his journey must be one of short duration—a dash—for these reasons:

1. It is only in the spring of the year that he can travel advantageously over the ice-sheet, and this is so because the winter is too dark, while in the summer the warmth of the sun makes the snow soft and "sticky," fills the pockets with sludge and water, and aids the winds and currents in breaking up the ice. The favorable, practically the only, season for travel over this drifting, shifting field of ice, is confined to March, April, and May, with what little of February one is resolute enough to use amid the darkness, and a part of June in which he may still do something before the snow becomes too soft. Thus the pole-seeker has at his command from 110 to 125 days, according to the earliness of his start, in which to make his northerly journey and his return to the land.

2. Everything he and his dogs eat, as well as the fuel for melting ice into drinking and cooking water, must be carried from the land or the outmost depot, not only for the advance journey, but for the return. Nothing can be had on the way. There is a limit, of course, to the weight of load that may be carried, and if the sledge party started with supplies for a six months' campaign they would be so heavily burdened they could make no

A PAIR OF WALRUS KILLED FOR DOG FOOD

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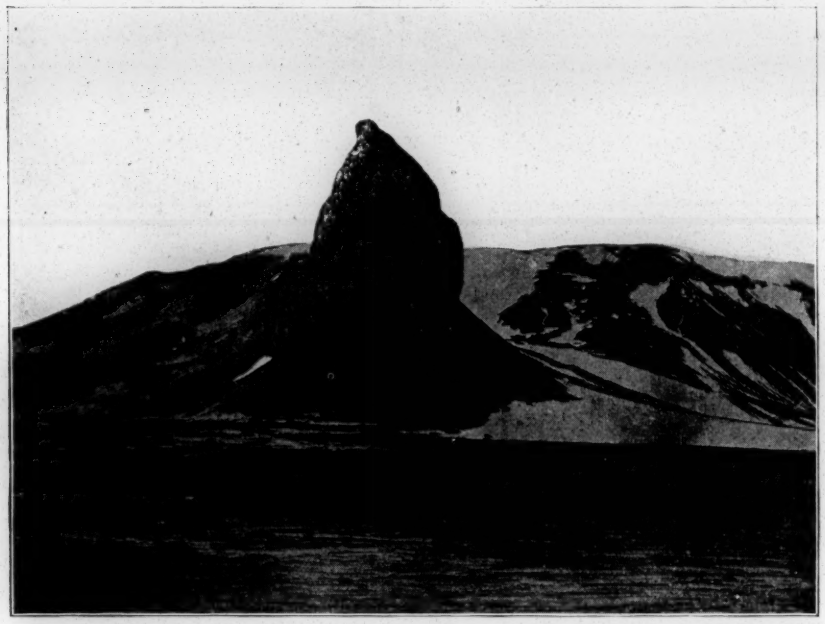
progress at all. At the minimum each man must have two pounds of food and each dog one pound per day, and the hauling power of a dog is limited to about 60 pounds and of a man to about 200 pounds. Besides, there is weight of sledges, instruments, bedding, weapons, etc., to be reckoned.

3. It is useless to establish depots upon the sea ice beyond the land, for the sufficient reason that they could never be found again, except by rare good luck. Even in winter the ice-sheet is never at rest. It is constantly drifting to and fro, with a general movement, as was shown by the voyage of the *Fram*, toward the west. If one left a depot upon the ice he could never be sure the ice had not opened there during his absence and destroyed it. On returning from their sledge journey, Nansen and Johansen made no effort to find the *Fram* again, though they were at no time more than 115 miles from the ship, and on their southward march, with a dreadful and doubtful prospect before them, they must have passed within 30 or 35 miles of her at farthest.

Limited in time and limited in weight, the explorer perceives

that the best and practically the only thing for him to do is to take advantage of the favorable season of from 100 to 125 days and make all his plans accordingly. The lighter his loads the shorter time he can remain out; the heavier his loads the slower must be his rate of travel. Between the two extremes he endeavors to find the happy mean and to apply to it the utmost of skill and ingenuity in keeping down weights and in utilizing motive power. Thus we see why it is only by the dash method that any one now seriously proposes to reach the Pole. Dr



MOUNTAIN AND GLACIERS AT CAPE TEGETTHOFF

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Nansen made his dash from the *Fram* after she had drifted far within the ocean, giving him the best start and the best chance to reach the Pole any one has had or is likely to have for some time to come. Peary proposes a dash from north Greenland. Andrée made his dash, bravely but recklessly, by balloon. Abruzzi essays a dash from near Nansen's winter hut and our own outpost.

We tried the dash, too, and might have done very much but for an accident which overtook us. In preparation for this effort

to reach or approach the Pole, and also to aid the work of exploration, which also formed a part of our plans, we established at Cape Heller, near the 81st parallel, an outpost or depot of supplies. This was done immediately after our arrival in Franz Josef Land. Within two days after the *Frithjof* sailed back to Norway a party set out with small boats and sledges for the north. Their instructions were to establish a depot as far north as possible. When they started the ice-sheet upon the bay and the straits was solid and apparently unbroken. But conditions

PREPARING THE HEADQUARTERS HUT FOR WINTER

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often change with amazing rapidity in the Arctics, and so it was in this case. Within less than 48 hours the party found themselves involved in the greatest difficulty on account of the sudden breaking up of the ice and its rapid drifting out to sea under the influence of strong offshore winds. Nothing but desperate, even heroic, work enabled them to save their lives and the valuable equipment. Finally managing to reach the land, they struggled northward for a month, sometimes upon the ice-sheet, more often upon the rough shore, occasionally crossing glaciers and now and then advancing some of their heavier weights by boats in com-

paratively ice-free water, and were at length compelled to stop for good on account of drift-ice in the channel and the rapid approach of winter.

At Cape Heller they built a hut of rocks. A few pieces of driftwood served for the ridge-pole. The hides of walrus, killed in the water pools of Austria sound, near by, formed the roof. In this hut were accumulated about a ton of stores for use the following spring—sledges, boats, and other articles needed on sledge journeys. Forty dogs were there also, and for their sustenance during the winter the flesh of fifteen walruses was cut up in small squares and stored in a bin built of snow-blocks. To protect the hut from the winter's storms high walls of snow were built, and these made the premises look so much like an old-fashioned fortification that Mr Baldwin, leader of this party, named the place Fort McKinley. As soon as everything was made snug for the winter Mr Baldwin, pursuant to his instructions, asked for volunteers to remain at the hut through the winter to guard the supplies and care for the dogs. All five of the Norwegian members of the party offered their services, and great was the disappointment of the three who were not chosen. The two men assigned to the task were Paul Bjoervig and Bernt Bentzen, of Tromsö, both sailors, neighbors, and warm friends. Together they had often talked of the pleasure it would be to pass a winter in the Arctics in a little hut well stocked with food and tobacco, and this was to be the realization of their dream.

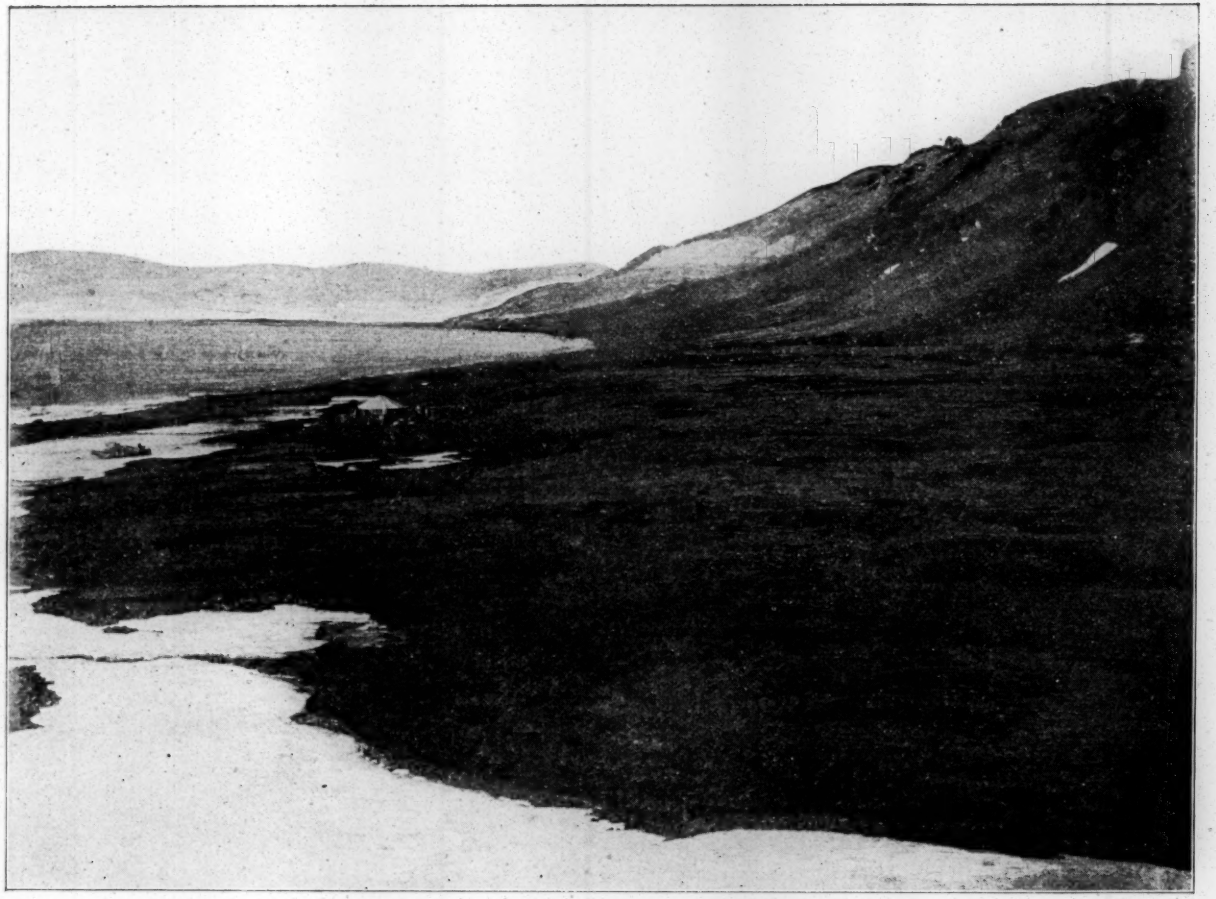
Their enthusiasm was not due to inexperience. Paul Bjoervig was a veteran Arctic sailor and traveler, and had been with the Wellman Expedition of 1894 to the north of Spitzbergen. Bernt Bentzen was a member of Dr Nansen's crew aboard the *Fram* on that famous drift-voyage through the polar seas. Both men were happy and well when their comrades left them and started for our headquarters at Cape Tegetthoff, just at the beginning of winter. It is a coincidence that but a few miles to the westward of this hut is the spot where Nansen and Johansen passed the winter of 1895–'96 in a similar structure, built out of such materials as could be found upon the ground.

Meanwhile those of us who had remained at Cape Tegetthoff were busy preparing our own house for the long winter. As first erected, the hut was a mere shell, two thicknesses of thin boards with an air-space between, and a roof of two layers of canvas. The house was ten-sided, one of the sections containing a door and two others little windows. With planks converg-

ing at the apex of the roof we built another shell around the whole, walled it up with blocks of snow and stretched a third roof over it in the shape of an old discarded mainsail from the *Windward* which we had picked up at Cape Flora. When the winter came on in earnest the snow drifted over the house, fairly burying it, as well as the store-shed which we had built at one side of Russian timber. The little windows were buried under walls of snow six or eight feet in thickness, and about this house there were in the Arctic darkness just two signs that it was actually used as a human habitation—the little stovepipe at the apex of the roof, pouring forth its cherry sparks, and a small, black hole at the entrance to the shed, through which we crawled in making ingress or egress.

We built an observatory of snow-blocks, too, for protecting the meteorological and magnetic instruments from the fury of storms, and within this enclosure (it had no roof) Mr Baldwin, the meteorologist from the U. S. Weather Bureau, and Mr Harlan, the physicist, carried on a series of observations throughout the dark season. Mr Baldwin secured continuous thermograph, barograph, and anemometer records during our entire sojourn in the Arctics, and also made a most painstaking study of the *aurora borealis*, comparing the manifestations here with a similar study which he had made in Greenland some years before. His observations and conclusions in this important field of scientific inquiry, when elaborated and published, as I understand they are to be by the government, will, in my opinion, form a valuable contribution to the literature of that topic. Mr Harlan also studied the aurora, particularly from the point of view of its effect upon the magnetic needle, and his report thereon, as well as his general study of the physical conditions of Franz Josef Land, I intend to publish in proper form and place as soon as possible. Dr Edward Hofma, medical officer and naturalist of the expedition, has a most interesting report concerning the fauna and flora of that region.

Within our hut we passed a very comfortable winter. It is true that at times the thermometer, hanging upon the wall 10 feet from the diminutive stove, had hard work keeping its head above the zero mark, and where we sat upon our packing boxes, each in his own "corner," hoar-frost was constantly hanging upon the wall; but all this was reckoned as nothing; nor did we suffer from the effects of the long night. If there was any melancholia its victim managed to keep his sufferings pretty well concealed.



PLATEAU AT CAPE TEGETTHOFF SHOWING HARMSWORTH HOUSE, THE WELLMAN EXPEDITION HEADQUARTERS

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THE HEADQUARTERS HOUSE — FROM A PHOTOGRAPH TAKEN BY MOONLIGHT DURING THE WINTER NIGHT

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All three of my American comrades, unfortunately, were ill for short periods during the winter, and this made it impossible for any of them to accompany me upon the sledge journey to the north, for which we were all winter busily preparing. But these ills might have shown themselves at home, and were in no way due to the climate or the surroundings. We had good beds, good food, including plenty of fresh bear meat, and American oatmeal, bacon, and flapjacks were not forgotten.

To the most of us the winter seemed short and not much of a test of patience. True, the absence of the sun for 127 days and nights was somewhat of a deprivation, leading us to the conclusion that if we were going to pass the remainder of our days in those regions sun-worship is the religion which would most strongly appeal to us; but we had work to do, bears to kill, scientific observations to carry on, books to read, exercise in the open air to take when the winds did not blow too severely, and the night was none too long. Almost every day we were out for a walk or a run upon snowshoes, and glorious it was to get about in the crisp air and the bright moonlight. But for the moon this far-northern world would be the very depth of gloom during the winter; but when the skies were clear and the moon was full the Arctic night was almost as bright as a winter day in temperate zones, and some of our best photographs were taken under these conditions.

Bathing was not neglected by any member of our party, even in the coldest weather. A tub of water was taken into the storehouse, one man at a time, and though the temperature there was usually from 5 to 15 below zero, we stripped and bathed in tolerable comfort, and without taking colds. In fact, such a thing as a cold the writer has never suffered from in the Arctic regions, though he has bathed in the open sea, diving from icebergs, and refreshed himself by a naked plunge in a natural tub formed of ice, floor and walls. Wool is now admitted to be better than furs for extreme cold, though some travelers cling to fur garments. In the Arctics one does not suffer from the direct effects of cold, but from its indirect effects in the formation of frost and damp within the clothing due to congelation of the exhalations from the body. It is for this reason that wool possesses superiority to skins, as the former permit the moisture to pass through the fabric, the frost forming outside, while furs retain it within. Upon the sledge journey, in temperatures ranging from 10 to 48 below zero, the writer wore no furs, save a pair of reindeer-skin

moccasins upon his feet. Within these moccasins were from three to five pairs of thick woolen stockings, these being surrounded by loose dry grass to absorb the moisture. He never once suffered from cold feet, and even after he had met with an accident and the circulation in one of his legs below the knee was almost wholly stopped, he suffered no frostbites. Upon the hands wool is better than skin. We usually wore two pairs of ordinary woolen mittens. The inner pair was dry and warm, while the outer pair was filled with frost, which could be shaken out at intervals.

February and March were our coldest months, and these were the months of the sledge journey. The lowest temperatures observed by us were a little under 50° Fahrenheit, not as great a degree of cold as is observed every winter in Siberia and in the interior of Alaska; but it must be remembered that all of our observations were taken at the sea-level, where the relative humidity of the atmosphere is greater than upon the elevated table-lands of Siberia or in the mountains of Alaska. Franz Josef Land we found to be a region of storms, due probably to its proximity to the comparatively warm Barents sea to the south, where the influence of the Gulf Stream is quite marked, and to the fact that it lies directly within the track of what might properly be called the Arctic trade winds.

This Arctic trade wind, result of the same causes as the trade winds so well known to navigation in the southern hemisphere, blows from northeast to southwest, as the trades of the region below the equator blow from southeast to northwest. In both cases the chief causes are the rotary motion of the globe and the flow of cooled air toward warmer zones along the surface of the earth. It is this trade wind which produces the set or current of the Arctic seas from the northern coasts of Siberia to the great outlet of the ocean between Greenland and Spitzbergen—the same movement of waters that Dr Nansen relied upon to bring the *Fram* through in safety. In Franz Josef Land we had opportunity to observe not only the effects of this current, pouring down through all the sounds and straits summer and winter, either under the ice or breaking the ice-sheet and carrying the débris with it, but also the meeting of two opposing forces, namely, the Arctic trades and the Gulf Stream. The mighty ocean river that debouches from the Gulf of Mexico, traverses the coast of North America, and crosses the Atlantic to the shores of Great Britain, divides there into two branches.

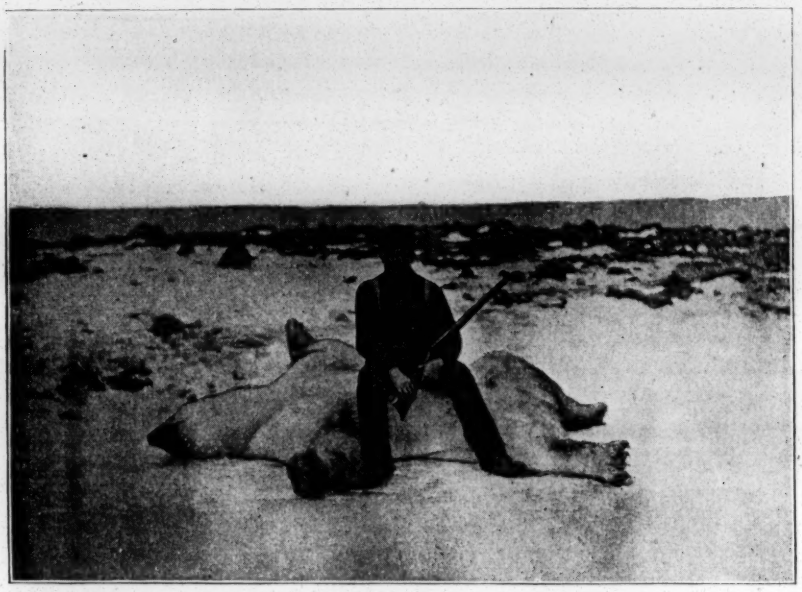
One flows southward toward the equator, while the other impinges against the coast of Norway, keeping ice-free all winter the fiords and harbors of that picturesque country even farther north than the latitude of Point Barrow, in Alaska, and then flowing on into the Barents sea against the western coast of Nova Zembla and, thus turned northwestward, continuing its course in a westerly direction along the southern coasts of Franz Josef Land. There our investigations and observations enabled us carefully to note the mingling of the two currents. Just as the Gulf Stream is the product of the piling up of masses of water within the Gulf of Mexico by the trade winds of the southern hemisphere, so the Arctic current which brings the icy waters down into the Atlantic from the polar sea is the product of the northern trade winds. We were thus at a most advantageous point for study of this vast circulatory system of the sea. We were at the meeting of the waters from the two Poles of our earth.

Of great importance to explorers is this constant movement of the liquid masses which impinge upon Arctic lands. It frees the coast of Franz Josef Land of ice through the summer months, making navigation all along its shores comparatively easy at that season, even though there may be a thick belt of almost impenetrable pack-ice farther to the south. It brings to Arctic shores, too, from the headwaters of Siberian rivers, masses of driftwood for fuel and building purposes. It seemed to us a remarkable beneficence of nature that we should find timber from the interior of Asia to put into our little hut and to burn with blubber for our fires a thousand miles above the tree limit and within six hundred miles of the North Pole itself.

While wintering at Cape Tegetthoff we burned considerable quantities of this driftwood, and at times we thought it not such a bad country, after all. Perfectly fresh water came pouring down from the glaciers in the summer months and formed limpid pools at our very doors. Building materials we sawed out of frozen snowdrifts, blocks as true and almost as firm as marble. Bears had a comfortable habit of walking into our front yard to be shot, and right nice steaks and stews we contrived to make of them. The surf threw firewood upon the beach right in front of our dwelling, and never at any time did we have need of the iceman.

The sunless winter was long, but not tedious. Best of all, good fellowship abode with us. It is an Arctic axiom that ex-

ploring parties should be of but one nationality. It is a pleasure to record that though we were Americans and Norwegians living in one little room, night and day, for five months, not a word of discord between Yankees and Norsemen marred the novel experience. No better or more faithful men ever served under the banner of Norway than those young men who lived with me under the Stars and Stripes at Cape Tegetthoff that winter, in the most northerly inhabited house in the world, and who subsequently accompanied me upon the sledge journey.



"BEARS WALKED UP TO OUR DOORS TO BE SHOT"

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It was on February 18 that we set out upon this trip to the north. The sun had not risen, and the days were short and dark. But well we knew that if we were to make the Pole, or approach nearer to it than any of our predecessors, we should have to start very early in the Arctic morning. We stumbled along in the gloom, through deep snows and rough ice, encountering storms and great cold, sometimes making but two or three miles a day, and at last arrived at our outpost at Fort McKinley. This was near the end of February. Here we found that a remarkable tragedy—one of the most remarkable tragedies known

to the history of Arctic exploration—had occurred during the winter. Bentzen had been taken ill in November, shortly after our men had left the two there together, and had never recovered. Lingering till January 2, carefully nursed by Bjoervig, death had then come to Bentzen's relief. All this Bjoervig told me, when, at the head of our little procession, I met him standing in front of the tunnel which led down into the now snow-buried hut. Then we crawled in, and Bjoervig poked up the blubber fire and started to make me some coffee, as I sat looking about at the strange little cave, its walls coated with hoar-frost even within two feet of the brilliant flames.

"Where did you bury Bentzen, Paul?" I asked.

"I have not buried him, sir," was the reply. "He lies in there."

I lit a little lamp—a bicycle lamp; it had been here in Washington—and walked into the darkened portion of the hut, partly partitioned from the remainder of the apartment, to which Paul had pointed. As soon as my eyes had become accustomed to the peculiar light which the frosted walls and roof reflected from the dim lamp, I saw at my feet a one-man sleeping bag, bearing evidences that it had been occupied by a living man the night before. By its side, within arm's reach, lay another bag. This one was occupied, and had been for several months. Bag and contents were now frozen as solid as a rock. For two months Bjoervig had slept by the body of his dead comrade—two months of solitude amid the Arctic darkness when night was not to be distinguished from day—two months alone with the dead in this Arctic tomb.

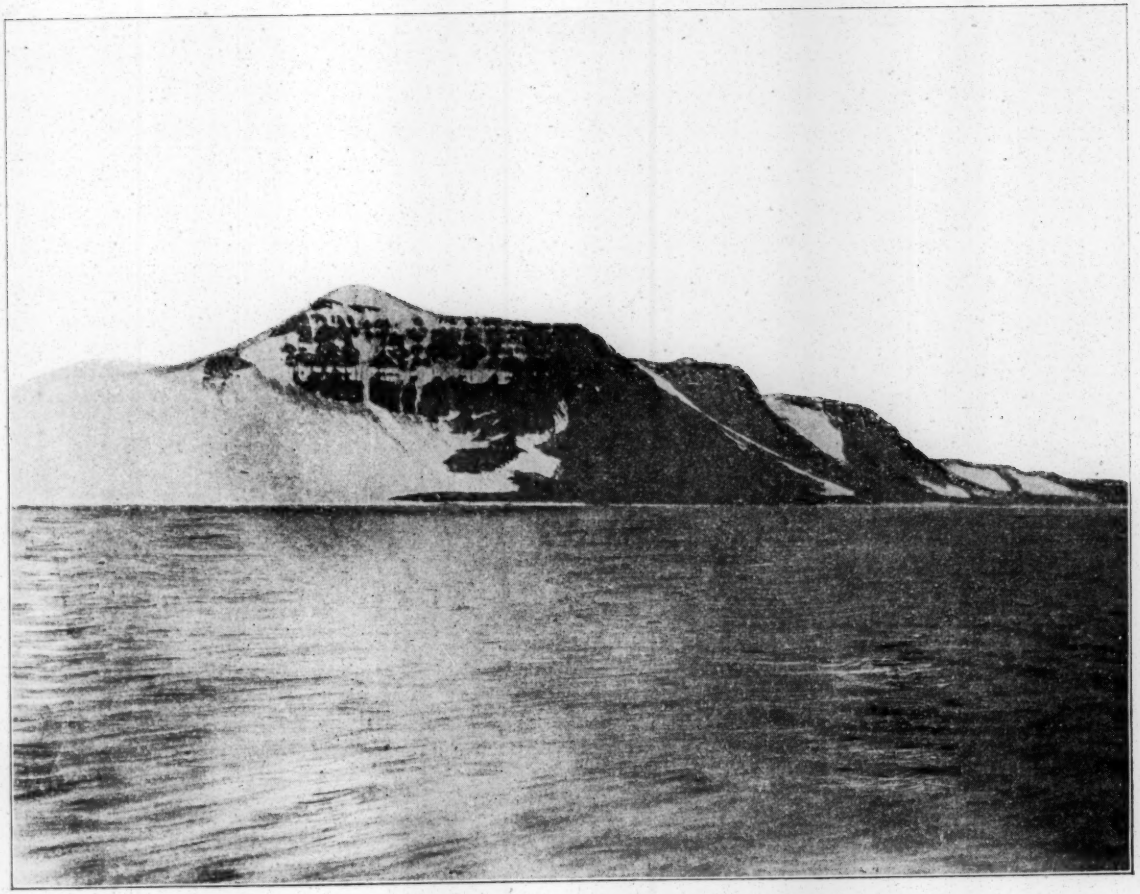
Bjoervig had not buried Bentzen because he had promised him he would not, and he had promised because of the sick man's fear that if buried in the cold and darkness it would be in such manner that the bears and foxes might get at his remains.

Notwithstanding this dreadful ordeal through which he had passed, Bjoervig was sane, cheerful, almost normal. He was a little nervous, and had difficulty in getting sleep; but next day he helped us drag out the body and carefully bury it in a hole which the wind had hollowed out. It was a bitter day, 45 below zero, and a fierce blast blowing down from the glaciers. But the most industrious man of us all, after the little funeral ceremony was over, was Paul. For hours he was busy chinking up all the openings in the walls around the rude tomb. "I promised him the bears and foxes shouldn't get him," he explained.

We took Bjoervig with us, contrary to our original plan, and continued our journey to the north. Though the weather was still gloomy, the snow deep in places, storms too frequent, the ice rough, and the loads heavy, we made satisfactory progress. By March 20 we were off the east coast of Rudolf Land, near the 82d parallel of latitude. Our prospects were bright. We had traveled one-fifth of the way to the Pole, and had yet at our command for northerly advance six or seven weeks of the most favorable season. We had passed through the worst of the darkness and cold, and had just reached that period when, in those latitudes, we were to have the sun all the time in the heavens. All our men and equipment were in good condition, and we were scenting the victory that lay before us when a seemingly trivial accident occurred to one of our number. All pride goeth before a fall, and this man, glorying in his strength and endurance, slipped while working his sledge through heavy ice with his team of dogs and fell in a little crevice in the path. The hurt which he received would not have been serious had he stopped for ten days or a fortnight for rest; but in that work, with the farthest north, and perhaps even the Pole itself, beckoning him on, one does not stop. He always thinks he will be better the next day and quite well the day after. So he keeps going, dragging himself along, till he drops in the snow and can go no farther.

Then came the bitter retreat. The injured man had to ride upon a sledge and be dragged by his faithful companions and his dogs. He suffered, of course, but quite as much in his pride as in his body, for it is inglorious to be hauled off the field of battle. His Norwegian comrades were as brave as lions and as tender as women. They nursed him and cared for him, unmindful of themselves. They made the ambulance, bounding along over the rough ice, as comfortable as they could; the tent they converted into a hospital, and bandaged the injured limb with hot water in temperatures of 40° below zero. Fearing their broken leader might die upon their hands, they made a gallant race for a man's life back to headquarters at Cape Tegetthoff, arriving there April 9.

If the man riding southward upon the sledge in those first days of April looked longingly to the eastward, where the glint of ice-capped and wholly unexplored lands was seen under the rays of the sun, and planned that in a couple of weeks he would take his sturdy Norwegians out there to explore and



CAPE GREELY — FRANZ JOSEF LAND

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←····· *Track of Steamer "Capella," 1899, which brought back the Expedition.*
←←····· *Track of Sledge Journeys of the Wellman Expedition, 1898-'99.*
★ *The Northernmost Point Reached by the Expedition. (565 Miles from the Pole.)*

MAP OF FRANZ JOSEF LAND ARCHIPELAGO, SHOWING THE NEW LANDS DISCOVERED AND EXPLORED BY THE WELLMAN EXPEDITION

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A. Royal Society island
B. Pritchett island
C. Brice island
D. Bliss island
E. Alger island
F. Jackson island
G. Brady island
H. Aagaard island
I. Simon Newcomb islands
K. Willis Moore islands
L. McGee island
M. Payer island
N. Lyman Gage island

c. Cape Elkins
d. Cape Vilas
e. Cape Hanna
f. Cape Foraker
g. Cape Fairbanks
h. Cape Gorman
i. Cape Tyrol
k. Cape Copeland
l. Cape Robert Hitt
m. Cape Frick

map, that was but another evidence that in Arctic exploration it is a good thing to have plenty of optimism, served in daily rations and carried in imperishable packages.

This journey was subsequently made, however, by a party led by Meteorologist Baldwin, and the result of it was that, whereas when the Wellman expedition arrived in Franz Josef Land the eastern limits of that land were unknown and formed a topic of discussion among geographers, they are now carefully marked out upon the map. By means of these two sledge journeys and a voyage in the unexplored parts of Markham sound subsequently made in the steamer *Capella*, which was sent after the expedition at the expense of my brother, Arthur Wellman, some 20 new lands or islands were added to the map of that archipelago. Upon these new lands, their capes and straits, we had the pleasure of placing the names of well-known American scientific and public men who had befriended the expedition, including that of the President of the National Geographic Society.

We bear testimony to the surprising accuracy of the survey of a part of Franz Josef Land which had been made by Payer, the discoverer of that region, 25 years before. His one great error, the location of an enormous glacier, capping a land of continental dimensions, extending northward from Wilczek Land, had been in part demolished by Dr Nansen, who had landed at the Freeden islands and crossed in his journey over the sea ice the spot where Payer had placed his Dove glacier. We completely finished the destruction of that geographic error. The Dove glacier does not exist, nor has Wilczek Land the form or dimensions ascribed to it by the Austro-Hungarian explorer.

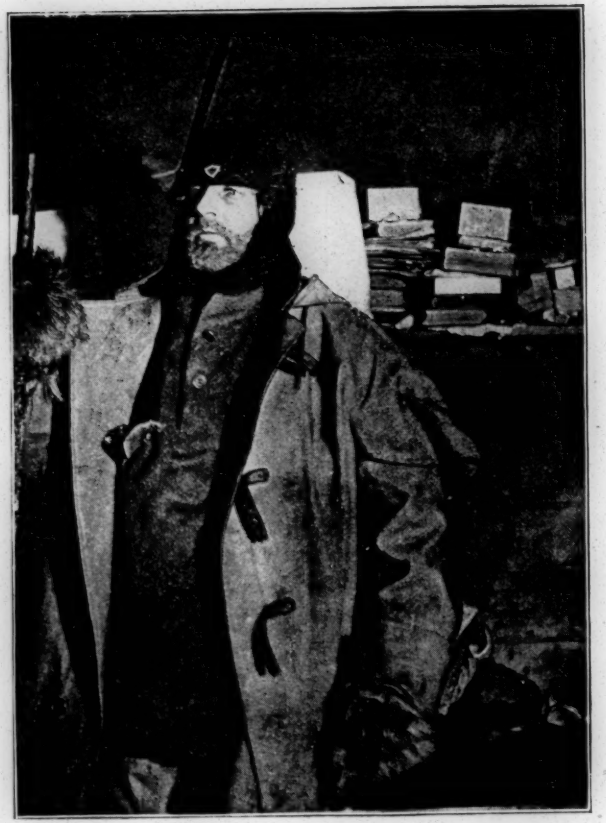
Four times did we cross the path of Dr Nansen—twice on our sledge journey to the far north, where we saw, but did not reach, three islands which he had passed without seeing, as they lay a considerable distance to the westward of his course, and twice in our steamers in the British channel and along the coast of Northbrook island at Cape Flora. We regret, of course, the accident which deprived us of our chance to wrest from the gallant Norwegian the honor of the farthest north; but if we have in a modest way been able to contribute something to the world's knowledge of the world, we feel amply repaid for all the hardships and all the sacrifices.

Above all, we are glad to subscribe to that cosmopolitan spirit which knows no frontier lines in the pursuit of knowledge. We

honor the Norwegian for what he did, and we expect great things of the young Italian prince, the Duke of Abruzzi. Upon meeting him in Franz Josef Land we went aboard his ship and welcomed him to the region of ice and snow and wished him good luck in a fashion which I feel sure was hearty and sincerely American.

We may have differences of opinion as to the value of reaching the Pole. If we apply the utilitarian test, it is of small moment; but so is a poem. And what is polar exploration but an epic of endeavor, in which all sordidness is left behind, and in which a man, knowing the risks and the chances of failure, ventures his life and his all in a combat against the forces of ignorance? For I deem it beneath the dignity of man, having once set out to reach that mathematical point which marks the northern termination of the axis of our earth, which stands as a sign of his failure to dominate those millions of square miles of unknown country, to give it up because the night is dark and the road is long. He will not give it up. The polar explorer typifies that outdoor spirit of the race which has led conquering man across all seas and through all lands, of that thirst for knowing all that is to be known which has led him to the depths of the ocean, to the tops of mountains, to dig in musty caves, to analyze the rays of light from distant worlds, to delve in the geologic records of past times. It will carry him to the North Pole, too, and that before many years shall have passed. Any one who supposes anything else of man doesn't know man. His acquaintance with human nature—with the nature of the adventurous races of our zone and times—is limited.

The eyes of the scientific world are turning with more and more eagerness to the Antarctic regions. Little now remains—beyond the Pole itself—in the Arctics; but in the far south there is great work to be done in every field of scientific exploration and investigation. I have here the suggestion to make to the National Geographic Society, and I make it after a careful study of the situation in all its bearings. It is that this Society institute a movement whose object shall be to gain from Congress an appropriation for an American Antarctic Expedition, to work in harmony with the expeditions which are to go into that field from England and Germany. The modest sum of $150,000 would equip a creditable expedition bearing our flag, and it is my belief that even in this utilitarian age the American Congress can be induced to devote such a small sum to such a great purpose.



MR WELLMAN READY TO START ON THE SLEDGE JOURNEY — FEBRUARY, 1899

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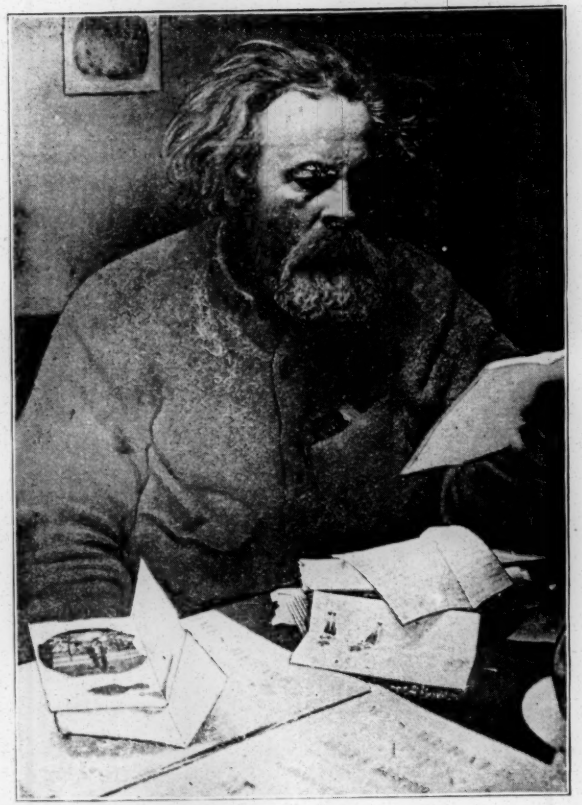

MR WELLMAN IN AUGUST, 1899

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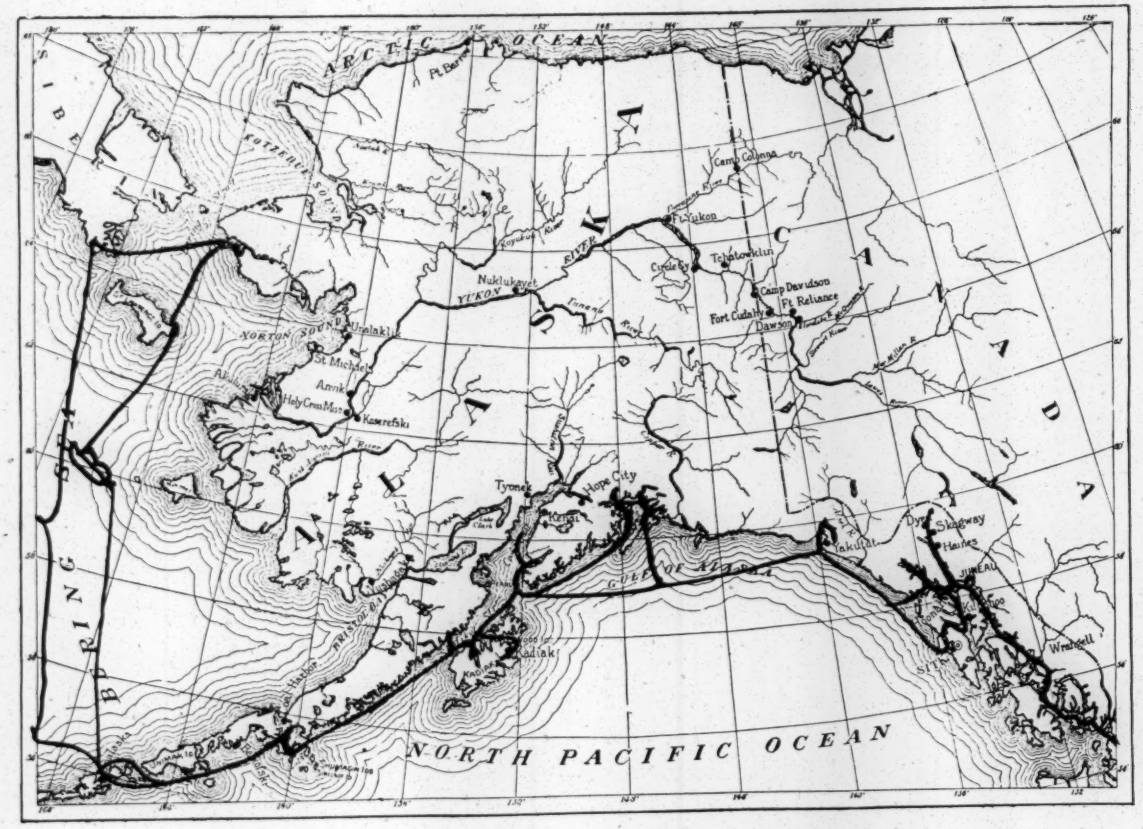


MAP SHOWING ROUTE OF HARRIMAN ALASKA EXPEDITION

THE HARRIMAN ALASKA EXPEDITION

By Henry Gannett,

Chief Geographer, U. S. Geological Survey

This expedition, notices of whose movements have appeared in earlier numbers of The National Geographic Magazine, reached Seattle on its return July 31. It left the same port for the north June 1, and in the intervening 60 days the *George W. Elder*, bearing the expedition, steamed 9,000 miles and visited points along the entire northwest coast from Seattle to Bering strait. Not less than 50 different landings were made. The *Elder's* route is represented in a general way on the accompanying sketch map of Alaska.

The party was composed of Mr Harriman's family and a few of his personal friends, with some 30 scientific men, making a total party of 50. This comprised zoölogists, botanists, geologists, and geographers. Every possible facility for the prosecution of scientific work was made, including outfits for inland travel and accommodations for the preparation of specimens, etc. Indeed, the whole expedition, although projected primarily as a pleasure trip for Mr Harriman's family, was subordinated in all ways to the needs of the scientific party. Even the movements of the ship were arranged day by day by a committee on board in the interest of the scientific work.

The general plan pursued was to follow the coast, making brief stops at numerous points for the purpose of making observations and collections. The steamer followed the inside passages as far as Glacier bay, making numerous stops on the way, but none of much duration until Glacier bay was reached. At this point, which is notable for the immense glaciers which reach the sea-level and discharge icebergs, the ship remained for several days, which were improved by the geologists in mapping the glaciers, paying special attention to the positions of their discharging fronts, for purposes of comparison with earlier measurements and for comparison by future students. A similar stop was made in Yakutat bay, where the steamer was taken not only to the head of Yakutat bay proper, but traversed its extension to its head. From Yakutat bay the expedition went to Prince William sound and spent a week in this interesting and almost unknown region.

Upon its shores are many glaciers, few of which are of record, which extend down to tide and drop bergs into the sea. In this region Mr Gilbert explored and mapped one of the finest glaciers of Alaska, situated upon the north shore, just west of Port Valdez, to which the name of Columbia glacier was given, the fiord into which it enters being called Columbia fiord. Port Wells, an extensive fiord on the northwest coast of Prince William sound, was also explored, and a sketch map of the upper part of this inlet is presented on page 511.

From Prince William sound the boat visited Homer, in Kachemak bay, and thence proceeded to Kadiak island, where parties were landed for hunting and for scientific work. Thence the boat coasted the Alaska peninsula, passing among the Shumagin islands, and thence on to Unalaska, stopping at numerous points on the route. Leaving Unalaska, a short pause was made at Bogoslof, a group of two volcanic islets, one of them a century old and the other but fourteen years of age; thence the course was north to St Paul island, where a short stop was made to visit the fur-seals, and thence to Plover bay, in northeastern Siberia, where the Innuit people were first encountered. The ship then crossed to Port Clarence, passing just south of Bering strait, within sight of the Diomede islands. At Port Clarence was found a fleet of arctic steam whalers which were waiting there for the ice to retreat from the vicinity of the straits. From Port Clarence the boat visited various islands in Bering sea—St Lawrence, St Matthew, and Hall islands—and thence steered a straight course for Unalaska. From that point she returned to Seattle, following much the same course as on the way up and stopping at comparatively few points.

Throughout, the expedition was greatly favored by the weather. It is a common saying that nothing can be certain about Alaskan weather except that it will be unfavorable. Still, during the two months that the expedition was in Alaskan waters there was but one rainstorm, and there were many clear, bright, sunny days. Although fogs and cloudy weather were frequent, they commonly occurred when there was little to see or do, and the work of the expedition was but slightly delayed or hampered by it.

The entire south coast of Alaska, from Portland canal to the Aleutian islands, is composed of a succession of glacial fiords, which continue inland as branching glacial gorges, reaching far up into the coast mountains. Many, if not most, of the gorges are still filled with glaciers near their heads, and in scores of

cases these glaciers still extend so far downward as to protrude their fronts into the deep water of the fiords.

A few thousand years ago, perhaps at the time the Egyptian pyramids were rising, the fiords which form the inland passages now traversed by the tourist were filled with great rivers of ice from the sea bottom nearly to the mountain summits. Indeed, the ice was spread in great sheets, covering all but the highest mountains. The retreat of the ice, though apparently slow, has yet been at so rapid a rate that the oldest land, which first emerged, has suffered little from subsequent aqueous erosion. The glacial carving is still strongly in evidence, and this in a region of excessive rainfall and steep slopes, where aqueous erosion is at a maximum. From these oldest regions, densely forest-clad, with the remains of older forests under foot, we may pass, going up the fiords to land continuously younger. As we approach the glacier the older, dead forests disappear. There is now but a single generation of trees, and these become younger and smaller. Soon they are succeeded by alder and willow bushes; then by grasses and annual plants, by mosses, and other low forms of vegetation, and, finally, by bare rock ridges, polished and scoured by ice and by bare glacial gravel a few miles only from the ice-front.

The glaciers are still retreating. The next generation will find few of them with their fronts still in the sea, discharging bergs. The thunder of the glacier, as it breaks off into the sea, will soon be no more heard in the land. A century ago, when Malaspina explored these shores, the ice extended much farther down the fiords than now. They found fiords closed which now are open, and their charts show that the inlets then extended far less deeply into the land. Malaspina sailed up Yakutat bay, passed Haencke island, and for the moment believed that to him it had been given to discover the long-sought northwest passage, but he was soon confronted by a blank wall of ice, which, extending from side to side, barred further passage. Sadly he named this upper portion of Yakutat bay Disenchantment bay, for his dream was over. Now the ice barrier, the front of Hubbard glacier, has retreated, and ships may pass 25 miles farther, away to the head of Russell fiord, as the southward extension of Yakutat bay has been named, in honor of Prof. I. C. Russell, who first explored it. When this fiord was dammed by the ice-front of Hubbard glacier it became a lake, with its level some 200 feet above sea, as shown by lake benches along its walls. Then it overflowed

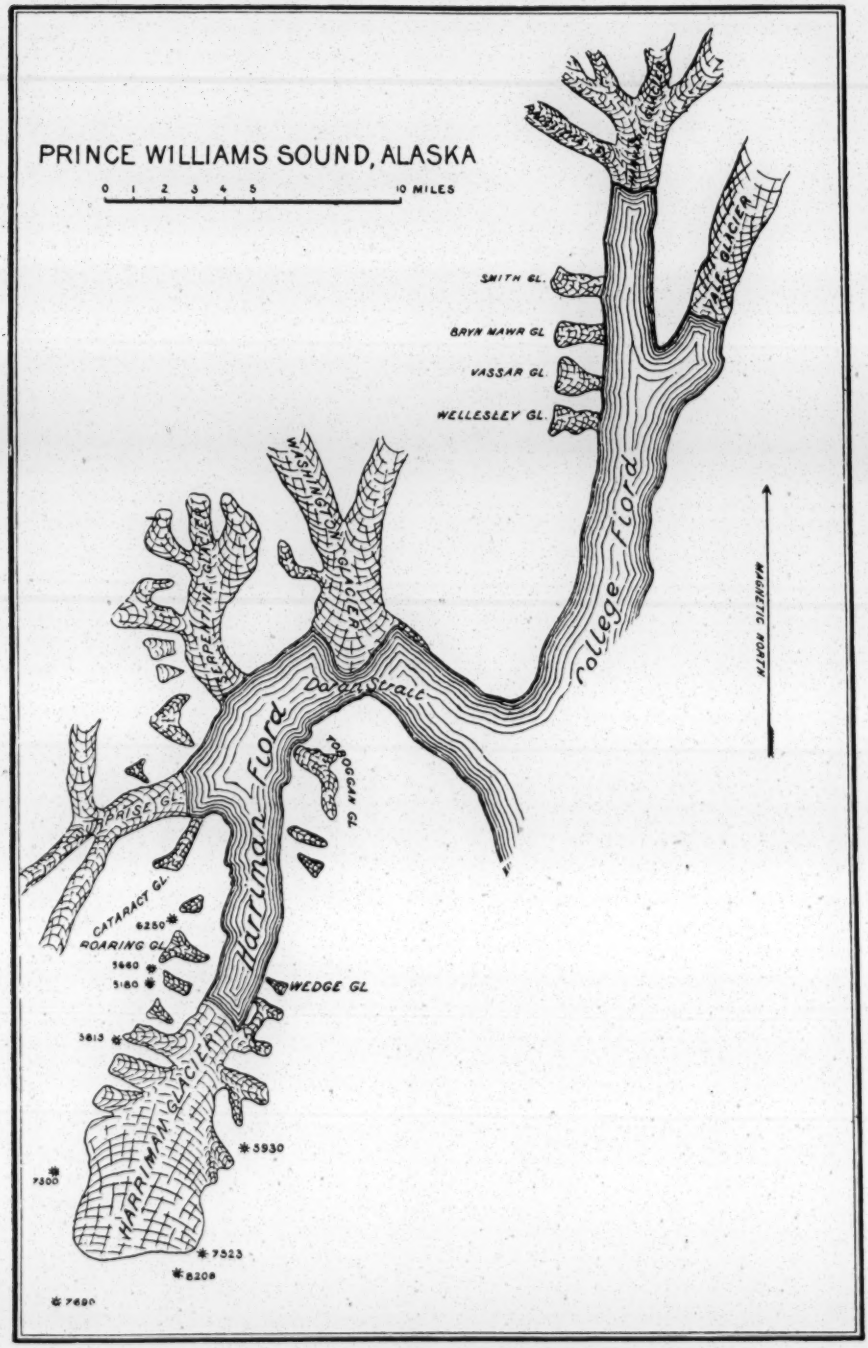
to the south, directly to the Pacific, or westward to the lower part of Yakutat bay. Here, therefore, is a fiord 25 miles in length, opened up within a century.

Port Wells, in Prince William sound (see map, page 511), is a fine example of the retreat of the ice and the opening of navigable waters. The old charts show this fiord to be only some 30 miles in length, whereas the explorations of the Harriman expedition in 1899 show that it now runs northward into the land not less than 40 miles. It terminates at the upper end in two branches, each occupied by a great glacier, Yale and Harvard, whose fronts are in the water, while along the west side of the fiord are four smaller glaciers, tumbling down in ice cascades from "hanging valleys" into the water. These terminal glaciers have retreated 9 miles in a century.

But the finest of the recent accessions to the navigable fiords of Alaska is the Harriman fiord, discovered and mapped by the expedition. This is a western branch of Port Wells and is not indicated on any chart. Five miles above its mouth it turns abruptly from a northwesterly to a southerly direction and runs in this course some 15 miles. At the bend it is nearly closed by the ice-front of Washington glacier. Indeed, although this glacier has been known for some time to the people who navigate these waters, it was supposed that it extended entirely across the fiord, closing it. It was therefore a great surprise, even to the local pilot of the *Elder*, when a close approach to the front of Washington glacier disclosed a passage through and an open fiord, lined with magnificent glaciers and mountains, beyond.

Under the circumstances it required great nerve to take a 1,700-ton steamer through waters so utterly unknown as these. There was no danger from shoals in the open fiord, but a projecting rock which might in earlier days have been a nunatak might have been encountered at any moment; but the ship was run safely to the head of the fiord, unfolding at every bend a wonderful scene of rock and ice.

From all indications, it is certain that within the century the four great glaciers which now drop bergs into the waters of Harriman fiord were united in one, which occupied the fiord from its present head to its mouth. Moreover, but few years have elapsed since Washington glacier bridged or dammed the fiord at its bend, closing it to all access except by land journey. From these, amid thousands of similar instances which might be cited, it is clear that Alaska is "Our Youngest Possession." The coast, at



THE UPPER PART OF PORT WELLS, PRINCE WILLIAMS SOUND, ALASKA

least, has but recently emerged—so far as it has emerged as yet—from its mantle of ice. But there are enormous areas still buried beneath ice coverings thousands of feet in thickness. The Muir glacier alone covers an area probably as large as the state of Rhode Island, and there are scores of others comparable with it in magnitude. The region north of Prince William sound is covered in greater part by glacial ice. There is more ice there than dry land.

One broad fact or conclusion, long ago pointed out by Mr John Muir, but persistently overlooked by geologists, is forced daily upon the attention of the traveler on the Alaskan coast. This is that the existence of glacial fiords is no evidence of a subsidence of the coast. The Alaskan fiords were cut and are being cut today by glaciers below sea-level. It may be that the coast is subsiding, but its fiord character is no evidence of this. Glaciers are now protruding their fronts into water a hundred fathoms deep and many miles from where the shoreline would be were the ice removed.

Of the results accomplished by this expedition little can be said at present, since little will be known until the specialists of the expedition have had time and opportunity to investigate the material collected. The movements of the party were arranged in such wise as to be especially favorable to the work of the biologists. The frequent stops made in many different localities afforded them an opportunity for a thorough study of the distribution of plant and animal life throughout a vast stretch of the coast. The comparatively longer stops made in the vicinity of the most important glacier regions enabled them to make quite exhaustive studies of the extension of plant and animal life over newly made land, recently freed from the ice covering, and in this branch of study it may well be that interesting and important results will be obtained.

THE METEOROLOGICAL OBSERVATIONS OF THE SECOND WELLMAN EXPEDITION

By Evelyn B. Baldwin,

U. S. Weather Bureau

In the following article I purpose to give merely an outline of the scope and character of the meteorological work of the second Wellman Expedition. The observations that were secured,

together with some account of the meteorology of the year spent in the Arctic regions, will form the subject of a separate paper. Through the courtesy of the Chief of the Weather Bureau, the instrumental equipment of the expedition was made as complete as possible within the short time available. It consisted of standard wet and dry thermometers, self-registering maximum and minimum thermometers, aneroid barometers, a barograph, a thermograph, an anemometer, and a water thermometer.

The observations may be divided into three series, *viz.*, those made on shipboard, in camp, and in the field.

The observations on shipboard began June 27, 1898, the day following our departure from Tromsö. They were made thrice daily, as nearly as possible at 7 a. m., 2 p. m., and 9 p. m., local time, the ship's position being duly noted. Each observation consisted of readings of the dry and wet bulb thermometers, water thermometer, salinometer, aneroid barometers Nos. 1134 and 1135, giving the atmospheric pressure in inches, and of the ship's barometer, indicating the pressure in millimeters, wind velocity, as indicated by an anemometer erected on the ship's bulwark, allowance being made for the speed of the ship, which, however, was very slow. In addition to the foregoing, observations were made as to the direction of the wind, the amount of cloudiness, and the kind and direction of clouds. This series of observations extended in a line from near North Cape to Vardö, Norway, thence to Archangel, which point was reached July 4; thence northward to about latitude 77° 54′ N., longitude 44° 58′ E., at which point the ship turned southward on July 11, returning to Vardö, and from Vardö northward again, July 17, reaching Cape Flora, Franz Josef Land, latitude 77° 56′ 27″ N., longitude 49° 42′ 18″ E., on July 28, and then, finally, eastward to Cape Tegetthoff, latitude 80° 6′ N., longitude 57° 54′ E., reaching the latter point on August 3, on which date the expedition ship began her return voyage to Norway.

During this voyage the southernmost occurrence of ice was noted in the course of the night of June 28, latitude 69° 20′ N., longitude 35° 00′ E. It consisted, however, of but small pieces. The highest temperature was recorded at Archangel, *viz.*, 77° F., July 4. But, in general, the temperature recorded in the southern part of Barents sea varied from 53° to 43° F., gradually sinking to from 37° to 32° F. along the southern coast of Franz Josef Land. The salinometer indicated the salinity of the sea to vary but little from 27 per cent, while in the White sea it

gradually diminished to zero at a point six miles below Archangel, in the Dwina river. The temperature of the sea varied from about 45° F. in the southern part to 30° F. at Cape Tegetthoff. Generally cloudy weather, with much fog at times, prevailed during the voyage.

With the departure of the ship, regular meteorological observations were taken on shore for two days, or until 7 a. m., August 5. Thereafter, till the night of October 30, a period of eighty-six days, during which time I was in the field in charge of the expeditionary advance party, the work embraced nearly continuous records of temperature and pressure by means of the barograph and thermograph, checked by means of standard thermometers and two excellent aneroid barometers, besides nearly continuous measurements of the wind movement and velocity by Robinson anemometers, and frequent eye observations of the clouds, general weather conditions, movements of the ice, etc.

The self-registering instruments were carried in a large basket, through which the air circulated freely. The basket rested upon an inflated rubber pillow. The anemometer was mounted on a hickory pole seven feet in length. Whether on the sledge or in the boat, these instruments gave entire satisfaction. Owing to the very slow progress made in advancing the equipment from day to day, the value of these field observations was not materially impaired by change of station, the largest radius of which did not exceed fifty miles in a straight line between Cape Tegetthoff and Fort McKinley.

From August 22 to September 19 a station was maintained at Storm bay, Wilczek Land, 35 miles northeast of Cape Tegetthoff, and we were thus afforded an exceptional opportunity of studying the meteorology of that storm-swept region. Strong southerly winds blew almost incessantly, accompanied at times by fog, snow, rain, and sleet, and on one occasion by hail.

On September 19 we made a forced march across Quereau glacier, Storm bay, to a low point of land near Cape Heller, where we built an outpost and named the same Fort McKinley. During this journey the self-registering instruments continued to record in a most excellent manner, the barograph indicating the height above sea-level (1,100 feet) and the inequalities of the surface wherever ice valleys were crossed.

As illustrating the weather on this journey, I quote from my journal as follows:

September 18: Weather clearer, but the wind from 2 p. m. (17th) to 10 a. m. (18th) averaged 19 miles per hour from the southeast; 5

o'clock p. m., moved the camp to the north side of Storm bay, on the edge of Quereau glacier, to an elevation of 100 feet; very thick snowfall and wind strong from the southeast; 9 p. m., blinding snowfall continues before southeast wind; 10 p. m., wind gentle, but accompanied by a shower of sleet and dense fog; 11 p. m., light fall of hail for three minutes. September 19: 11 a. m., weather cleared; temperature 28.0°; wind gentle, from the west; 3 p. m., station at an elevation of 1,100 feet above sea-level, on Quereau glacier, north from the previous camp; average wind velocity since 11 a. m., 20 miles per hour from the west; considerable fog at times; 8.30 p. m., station advancing northward, the elevation now being 1,130 feet; dense fog generally prevalent, being either "blown up" or formed upon the glacier by the west wind coming from Markham and Austria sounds; frequent glimpses of a golden glow upon the clouds from the fog hidden sun in the northwest assisted in keeping the course with the compass; 11 p. m., wind continuing strong from the northwest and darkness upon the moving station, but by noting the lines of snowdrift, we continued to advance. September 20: Quereau glacier, 1 a. m., crossing a series of inequalities or broad and gently sloping valleys leading toward the west face of the glacier; 2 a. m., the surface beginning to slope northward as well as westward; 4 a. m., first view of the summit of Cape Schmarda; 6 a. m., "station" at the foot of Quereau glacier, two miles east of Fort McKinley, and at 7.30 a. m. at Fort McKinley.

The closing days of September were spent in completing the fort and in cutting up walrus meat for dog food. During the night of September 30 and October 1, young ice formed on the surface of the sea, and it became impossible to use the boats save in open spaces. The temperature of the air had now sunk to 12° F.

Six days later I determined to make an effort to communicate with Mr Wellman, at Cape Tegetthoff, and to ask to be permitted to continue the meteorological work at Fort McKinley in person, and for this reason, as well as to determine the condition of travel southward, I dispatched, on October 8, three of our Norwegian supporters by boat to make the attempt to reach Cape Tegetthoff. They, however, returned in a short time, on the same day, and reported it to be an utter impossibility to force the boat through the "mushy" surface of the sea, and there remained now no other course to pursue except to wait patiently for the forming ice to harden, and then, agreeably to instructions, to return to headquarters, at Cape Tegetthoff. For the first time this season (October 11) the temperature dropped below zero, a half degree Fahrenheit, and on the 13th to 10° below. On the 14th, although the young ice was strong enough to support the weight of a large bear, it was still too unsafe to admit of

sledge travel. On the 16th, although the temperature of the sea water at the surface was 28° F., that of the air rose to 25° F.; fell again to —9° F. by the 20th; the young ice measured from seven to nine inches in thickness, and on the 22d we set out for Cape Tegetthoff, arriving there on the night of October 30. The lowest temperature experienced on this journey was 17° F., on the 27th, and much thick weather prevailed. The young ice was frequently not over two inches thick; it had apparently been broken up a few days prior to our journey, and in the subsequent freezing the surface had become much broken, thus making travel in the gathering darkness of the long Arctic night exceedingly difficult.

On reaching the base station regular observations were made until the arrival of the relief steamer *Capella*, July 27, 1899.

During my absence in the field, as above described, and a second time for a period of 35 days—April 26 to May 30, 1899—in the eastern part of Franz Josef Land, observations were zealously made by Dr Hofma and Mr Harlan. In addition to the data already noted, the occurrence of sunshine, miscellaneous phenomena, and auroral displays were duly recorded and described. Of the last-mentioned, there were obtained at least 140 entries or descriptions of displays occurring on 83 different dates. During my second absence in the field, a series of observations of temperatures, atmospheric pressure, clouds, and estimated wind velocities were obtained for comparison with the regular observations at headquarters.

PORTO RICO OR PUERTO RICO?

The editorial foot-note to my article on Porto Rico (p. 112) seems to render it desirable for me to state my reasons for spelling the name of the island in accordance with "the form commonly in use in England and the United States." They are as follows:

1. The U. S. Board on Geographic Names is not necessarily a final authority on the orthography of geographic names; its membership does not embrace lexicographers or linguists, and its chief duty is merely to simplify and unify custom in geographic nomenclature for administrative convenience.

2. The decision of the Board in favor of the spelling "Puerto Rico" was made several years ago, when the island was foreign territory, and when the name was not in frequent use in the official records and literature of the United States, and whatever may have been the merits of the decision at that time, it is now obsolete, as shown by official usage. The

usage includes (*a*) that of the President of the United States (creator of the Board on Geographic Names), who employs the form Porto Rico in all his messages and documents; (*b*) that of the local official government, which, since the American occupation, has been designated "The Military Department of Porto Rico;" (*c*) that of the Treaty of Peace, executed at Paris last year, in which the name of the island is given as Porto Rico; (*d*) that of the Post-Office Department, through which all post offices of the island are officially located in the "island of Porto Rico," and (*e*) the prevailing custom of the U. S. Department of Agriculture, the U. S. Geological Survey, and other governmental departments and bureaus (from which the membership of the Board on Geographic Names is made up), all of which use the form Porto Rico in their official publications.

3. The name Porto Rico is established by 300 years of world-wide usage, as I have shown in detail elsewhere. This form has been adopted by all the best English writers, and by all the world-famous cartographers of England, France, Holland, and Germany almost since modern geography had its beginning in the discovery of America.

4. The term Porto is easily pronounced and is written phonetically, while the word Puerto is practically unpronounceable in English, and hence involves non-phonetic writing; accordingly, the former is so fully in accord with the laws of linguistic evolution, which cannot here be fully set forth, that it could not possibly be supplanted by the latter.

5. If it is the principle of the Board to adopt "for other countries the names by which they are known to their own inhabitants," they have undertaken a needless and impossible task. In my opinion, it will be a long time before the English people will use such names as Kraljeorna Srbyia, España, Deutschland, etc., for Servia, Spain, and Germany, or before we can make the Germans, French, and Spaniards call our own country by any other names than the Vereingten Staaten, Les Etats Unis, and Los Estados Unidos, respectively. In endeavoring to enforce such a revolution upon a world-wide custom of language the Board is transgressing its powers and diminishing its field of usefulness.

R. T. Hill.

Washington, D. C.

THE NATIONAL GEOGRAPHIC MAGAZINE AND THE U. S. BOARD ON GEOGRAPHIC NAMES

On September 4, 1890, the President of the United States issued the following order:

As it is desirable that uniform usage in regard to geographic nomenclature and orthography obtain throughout the Executive Departments of the Government, and particularly upon the maps and charts issued by the various Departments and Bureaus, I hereby constitute a Board on Geographic Names, and designate the following persons, who have heretofore coöperated for a similar purpose under the authority of the several Departments, Bureaus, and Institutions with which they are connected, as members of said Board:

(Here follow names.)

To this Board shall be referred all unsettled questions concerning geographic names which arise in the Departments, and *the decisions of the Board are to be accepted by these Departments as the standard authority in such matters.*

Department officers are instructed to afford such assistance as may be proper to carry on the work of this Board.

The members of this Board shall serve without additional compensation, and its organization shall entail no expense on the Government.

BENJAMIN HARRISON.

EXECUTIVE MANSION, *September 4, 1890.*

The policy of the Board was fully set forth in its first report, pages 6–10, published in 1892; it also formed the subject of an article by Mr Henry Gannett, chairman of the Board, which appeared in THE NATIONAL GEOGRAPHIC MAGAZINE for July, 1896, and dealt at some length, and in an exceedingly interesting manner, with the various difficulties encountered by the Board in the performance of the important duty intrusted to it.

As originally organized, the Board consisted of representatives, ten in number, of the Geological Survey, the Coast and Geodetic Survey, the Hydrographic Office, the Corps of Engineers, U. S. A., the Light-House Board, the Department of State, the Post-Office Department, and the Smithsonian Institution. Nearly all its original members were engaged in geographic work of one sort or another, and their high professional standing undoubtedly lent great weight to their decisions. The rulings of the Board have with unimportant exceptions been fully sustained by public opinion, and the only criticism that has been heard has been called forth by that strict regard for consistency which has characterized the Board in all its decisions. In the various Executive Departments its rulings have had all the force of law.

Among the earliest of its decisions was the one determining the spelling of Puerto Rico, in which the Board adhered to its policy of adopting the orthographic form in local use. For the following six years *Puerto* Rico was the only form recognized in any of the Executive Departments. It was a report from the United States Consul at San Juan, *Puerto* Rico, that was published by the Department of State only a few days before the blowing up of the *Maine;* it was to *Puerto* Rico that United States mails were dispatched up to the breaking out of the war with Spain; it was a map of *Puerto* Rico that was subsequently issued by the Military Information Division of the War Department; it was a bulletin on the Trade of *Puerto* Rico that was published by the Department of Agriculture less than six weeks prior to the acceptance by Spain of the President's terms of peace.

With the outbreak of the war, however, American newspapers, with few exceptions, began to accustom the public to the form *Porto* Rico, and it was only a short time before this spelling made its appearance in the correspondence and publications of two of the departments. When the final Treaty of Peace was made public it was found that, either through ignorance of the fact that the Board on Geographic Names had made a ruling on the subject or by one of those inadvertences on the part of an engrossing clerk that have been known to invalidate entire acts of Congress, the form *Porto* Rico was the one used in that copy of the treaty,

and that only, which was retained by the representatives of the United States. How far the use of this form in so important a connection, whether by accident or by design, has affected the usage of the Executive Departments, it is impossible to say, but that in several of them the form *Porto* Rico is now in use is undeniable. Such use, however, is not nearly so general as Mr Hill would have us believe. In the three great geographic bureaus, the Coast and Geodetic Survey, the Hydrographic Office, where the charts used in the U. S. Navy are prepared, and the Geological Survey, the form *Puerto* Rico, said by Mr Hill to be obsolete, is the only one used, except that in the last-mentioned bureau the use of *Porto* Rico has been permitted in papers of which Mr Hill is, himself, the author, and in which he has insisted upon this form being used. For Mr Hill to quote Mr Hill may be amusing, but it is hardly convincing. The only notable instance of the use of the form *Porto* Rico in the Department of Agriculture is, similarly, in a recent publication of which Mr Hill is joint author. It is in general use, however, in the Post-Office Department and the Weather Bureau, but in neither of these is its adoption understood to have been the outcome of any very careful consideration, and certainly in the case of the Weather Bureau it can hardly possess much significance, seeing that equally conspicuous with *Porto* Rico in its maps of the West Indies is *Puerto* Principe.

The adoption or non-adoption of the Board's decisions by the Departments is, however, a matter concerning only such Departments and the Board. The object of this article is not so much to justify the Board's decisions as to justify THE NATIONAL GEOGRAPHIC MAGAZINE in regarding the Board as the one and only standard of authority on geographic nomenclature, so far as the government and people of the United States are concerned. If the need of such authority has been felt in the Executive Departments to the extent of calling for presidential action, how much more has it been felt by the editors of a Magazine the object of which is the extension of geographic knowledge, in whose pages appear, from time to time, articles dealing with those less-known regions of the world whose geographic nomenclature is still in its formative stage, and that desires accuracy and consistency in every statement that it contains. The editor's labors have been enormously lightened by the work of the Board on Geographic Names, and there is not the slightest disposition on the part of the present management to aid in the restoration of that condition of confusion and inconsistency wherein every man was a law unto himself by ignoring so much as a single one of the Board's decisions.

J. H.

PLACE NAMES IN CANADA

The first annual report of the Geographic Board of Canada, printed at Ottawa, in 1899, by order of Parliament, has come to hand. This is the first report of the Canadian Board on Geographic Names—a board authorized December 18, 1897, and organized May 11 of the following year. The report gives the origin and history of the board, its by-laws, the rules adopted for governing its decisions, and a list of some 200 de-

cisions. These relate almost entirely to the northwestern part of Canada, in the Yukon region. It appears that as long ago as March, 1888, the question of the establishment of such a board was agitated, and again in 1892, but for some reason the matter was not followed up. The present board, constituted by an order in council approved by the Governor-General, is composed of two representatives of the Department of Marine and Fisheries, and one each of the Department of Railways and Canals, Postoffice Department, and the Geological Survey, and the Queen's Printer.

The by-laws of the board governing its organization and methods of procedure are very similar to those of the United States board. The rules of nomenclature which have been adopted are also quite similar, but we note the absence, except by inference, of the most important of all such principles—*i. e.*, that local usage should prevail. On the other hand, great stress is laid upon priority of publication of names. The first of these rules is as follows: "When the priority of a name has been established by publication, particularly when such publication has occurred in any standard or authoritative work or works, that name should, if possible, be retained."

We do not think that our Canadian neighbors appreciate what the result of the application of this principle will be on their nomenclature. It is safe to say that the majority of Canadian place names, as now used, are not identical with those first applied. From our limited knowledge of the history of the place names of Canada, we could cite scores or hundreds of names which, as now used, are different from those originally applied in maps and books. In biology it may be possible to carry out this principle of priority, although it must be said that its application in this branch of science involves a vast deal of labor and confusion, but in geographic names it is simply impossible.

The organization of the Canadian board will relieve our United States board from the necessity of making decisions on names in Canada, and doubtless our board will accept, without question, all decisions made by the Canadian board.

H. G.

THE ANTARCTIC CLIMATE

Henry Arctowski, the meteorologist of the recent Belgian Antarctic expedition, in *The Geographical Journal* for October gives a preliminary account of the meteorological observations conducted by him during the expedition. Because of their relatively small distance from the open sea and great distance from the pole, the positions ranging from 81° to 95° west longitude and 69° 50′ to 71° 30′ south latitude, two distinct types of climate were experienced, according to the direction of the wind—a continental and an oceanic. July was the coldest month, its mean temperature being —23.5° C. (— 10.3° F.), and the lowest temperature observed during the month, —37.1° C. (—34.8° F.).

The warmest month was February, with a mean temperature of —1.0° C. (30.2° F.), and a minimum for the month, —9.6° C. (14.7° F.). If we regard June, July, and August as the antarctic winter months, and De-

cember, January, and February as summer, we may take it that the mean winter temperature is — 16.8° C. (1.8° F.), and the mean for summer — 1.5° C. (29.3° F.).

From his observations, Mr Arctowski concludes that between the seventieth and seventy-first parallels of the southern hemisphere and amid the ice of the Antarctic ocean—first, the mean temperature is lower than that of the northern coast of Spitzbergen (Mossel bay, 1872-'73, — 8.9° C. (16.0° F.)); second, the minimum temperature is quite as low as the minima observed on the east side of Greenland (Sabine island and Scoresby sound); and, third, the mean temperature of the three summer months is lower than the corresponding mean in the ice of the Arctic ocean. If we consider that a considerable fraction of the seventieth parallel of south latitude is land, we can suppose that it may have a mean temperature as low as the 70° N., and include a pole of cold with lower temperature as the Asiatic or North American poles of cold.

During the drift in the pack-ice hourly observations were made with a marine barometer and with an aneroid. While Mr Arctowski has not yet been able to apply exact corrections to these observations, the uncorrected values are near enough for present purposes. The lowest pressure observed during the winter was 711.74 mm. (28.022 inches), and the highest 772.14 (30.400 inches). The mean value of the monthly variations of the barometer, amounting to 34.30 mm. (1.350 inches), shows very clearly that the cyclonic belt extends beyond the polar circle. The three months of almost continuous daylight (November, December, and January) are characterized by a very small variation of pressure—only 23.95 mm. (.943 inch). The three corresponding months of winter have also a mean less than those for the intermediate or equinoctial months. The differences between the annual and monthly means show that February, March, and April form a negative group, in which pressure is relatively low; the three months of polar night form another group of maximum barometric pressure; then follow August, September, and October—months of decreasing pressure—a group which, although not exactly negative, forms a distinct secondary minimum; and, lastly, three months of polar day forming a secondary maximum of pressure. The existence of a direct, simple relation between the barometric pressure and the progress of the sun is at once obvious.

The winds blew from northerly and southerly points with almost equal frequency, but easterly winds predominated over westerly. The sky was usually overcast, most frequently with a thick layer of stratus which formed a uniform gray covering and often persisted for days or even weeks together, with only short breaks. The number of days during which the air did not remain saturated —*i. e.*, on which the hygrometer indicated a humidity of less than 90 per cent—was October, 12; November, 18; December, 22; January, 15, and February, 11. If ice deposits from fog and similar precipitation are included, snowfall is recorded on 257 days and rain on 14 days of the year. Speaking generally, it may be said that the weather was extremely cloudy; that fogs were frequent; that snow fell on many days, and that the air was saturated nearly the whole time.

GEOGRAPHIC LITERATURE

Puerto Rico: Its Conditions and Possibilities. By William Dinwiddie. With Illustrations from Photographs by the Author. Pp. 295. New York and London: Harper & Brothers. 1899. $3.00.

Mr Dinwiddie's book excels as a minute description of the industrial conditions and commercial possibilities of the island and in the excellence of the illustrations made from views from his own camera. Those who are merely interested in the utilitarian side of Porto Rico will find this an excellent book of reference. The scientific statement is a little halting, however. For instance, an illustration of one of the white limestone hills between Utuado and Lares is entitled "coral formation," when in fact it is one of the finest examples of the truly sedimentary tropical oceanic white limestones we have ever seen. Mr Dinwiddie is excusable, however, for many geologists have persisted in terming all the tropical white limestones "coral formations." In the long chapter entitled "The Great Caves" the author commits the common but provoking blunder of treating technical scientific publication as no publication. In order to increase the reader's anticipation of his own glowing discoveries which are supposedly to follow, he begins this chapter with the remark that "it is astonishing how little is known about the geology of the island." A few lines further on he says that the owner of the caves "told us that several years ago an Englishman, a member of some British scientific society, had paid a short visit to the caves, . . . and it is quite likely that a report of its wonders has been published in the scientific journals of Great Britain." Perhaps if the "scientific journals" had been examined, in them would have been found at least an intelligible description of the caves, which, so far as Mr Dinwiddie's researches are concerned, only resulted in about 3,500 words of "padding," leaving the reader in as profound a darkness concerning the nature and origin of the caverns as that which must exist in these wonderful depths—at least, he in no manner adds to that knowledge of the geology of the island which he assumes to be so deficient. It is also regrettable that Harper & Brothers permitted the use of the spelling "Puerto Rico," which is no longer excusable, since the island has been officially designated Porto Rico by the United States government. The work is well indexed and on the whole is a credit to its author and publishers.

ROBERT T. HILL.

Japan in Transition: A comparative study of the progress, policy, and methods of the Japanese since their war with China. By Stafford Ransome. 8vo, pp. xvi+261, with 55 illustrations and 4 maps. Harper & Bros.: New York and London. 1899.

This book, written by a journalist trained in the study of foreign peoples, aims to present a picture of the present life, customs, industries, and politics of the Japanese, especially in their relations to the rest of the

world. The author describes the accommodations for travel, the hotels and railways, the attitude of the natives toward foreigners, the condition of education, of Christianity, the Japanese moral standards and business integrity, international relations and politics, the condition of Japan's industries, etc. All these subjects are treated with freedom and fullness and by the pen of a master. Mr Ransome finds theoretical education well advanced among the Japanese, but practical education, the power to apply knowledge in doing things, he finds far behind. He judges the work of Christian missionaries to be largely a failure. In morals his verdict is that the Japanese are not behind the Anglo-Saxon, but different. This is a charitable way of characterizing a moral code which sanctions polygamy and prostitution. In business integrity the Japanese are behind the Anglo-Saxon, as would very naturally be expected from their want of experience. In modern manufacturing these people are making a good beginning, but have a long road to travel before becoming serious competitors of the great nations. H. G.

Through Unexplored Asia. By William Jameson Reid. Illustrated by L. J. Bridgman. 8vo, pp. 499, with 3 maps and 52 cuts. Boston: Dana, Estes & Co.

This is a narrative of a portion of a notable journey through western China, eastern Tibet, and southern Mongolia during the year 1894 by the author in company with the late George Burton. The extreme western point reached was in approximate longitude 95° east, latitude 34° north, and the extreme northern point was just above the 40th parallel. The present volume, which is published independently, carries the narrative forward to the shores of Charing Nor. It is the intention of the publishers to present the remainder of the narrative in a second distinct work. The book is written in the form of a journal, through which is scattered, amid the narrative of adventure, much information regarding the geography of the country traversed and the habits and customs of the people encountered. H. G.

Alaska and the Klondike. By Angelo Heilprin. 8vo, pp. 315, with 35 illustrations and 3 maps. New York: D. Appleton & Co. 1899.

This is a narrative of adventure and observations made by the author during a trip to Dawson *via* Lynn canal and the upper Yukon in the summer of 1898. It is a bright, readable book, and is of value in portraying in vivid colors the life and social conditions in this unique mining camp when in the heyday of its prosperity, as well as the life on the trail and river. The illustrations are strikingly illustrative and are well reproduced. H. G.

The Empire of the South, its Resources, Industries, and Resorts. By Frank Presbrey. 4to, pp. 181. Published by the Southern Railway Company. 1899.

This book is an illustration of the highest art in advertising. The dedication of the book reads as follows: "This volume is dedicated to the people of the South by the Southern Railway Company, whose interests are identical with those of the states traversed by its lines." The economic truth here uttered is the key-note of the book. It is a descrip-

tion of the southland, the "territory" of the Southern railway, its scenery, its soil, its people, its products, presented in so charming a way that it reads like a novel, and profusely illustrated with the finest of modern work. Considered simply as a piece of book-making, it is, in paper, print, and illustration, one of the finest specimens that the century has brought forth. H. G.

Hawaii and Its People. The Land of Rainbow and Palm. By A. S. Twombly. Boston: Silver, Burdett & Company. 1899.

This book, an historical reader for young people, is a very readable account of the Hawaiian people, their legends, beliefs, and characteristics. It is divided into three parts, which deal, first, with the myths and folklore of ancient Hawaii; second, with the transition period, beginning with Captain Cook's discovery of it; and, third, with modern Hawaii. Into it also is woven much of the descriptive and economic geography of the country, and the book has a number of good and attractive illustrations. It is one of a series of supplementary readers published by the same firm, of which are *Australia and the Islands of the Sea* and *Our American Neighbors.* C. L. G.

The Yosemite, Alaska, and the Yellowstone. By William H. Wiley and Sara King Wiley. 4to, pp. xix + 230, with 157 illustrations. London and New York: John Wiley & Sons.

This book is an interesting narrative, somewhat in the form of a journal, of the trip made by the American Society of Mechanical Engineers to the San Francisco convention, in the spring of 1892.

GEOGRAPHIC MISCELLANEA

VESSELS drawing 25 feet of water can now enter Galveston harbor, and the foreign commerce of the port is rapidly increasing.

WORK on the Simplon tunnel is being prosecuted with great energy, but its completion is not looked for before the summer of 1904.

PROFESSOR WILHELM JOEST, who died some time ago during an expedition among the South Sea islands, is reported to have left $75,000 to the Ethnological Museum in Berlin. The interest of the bequest is to be used for purchasing new collections and assisting scientific expeditions.

DR F. A. Cook, surgeon and ethnologist of the Belgian Antarctic expedition, in an article contributed to *McClure's Magazine* for November, entitled "Two Thousand Miles in the Antarctic Ice," gives an interesting account of the experiences of the party during their winter in the South Polar regions.

THE Dismal Swamp canal was officially opened to traffic on October 14. The new waterway, which is 22 miles long, connects Chesapeake bay with Albemarle sound and enables light-draft shipping to avoid the much-dreaded Diamond shoals. It also opens up to improvement thousands of acres of fertile land and a considerable area of good hardwood and pine timber.

THE area under wheat in Argentina for 1898–'99, from which the crop was recently gathered, has been officially estimated at 6,150,319 acres. No official estimate of production has been received, but its aggregate amount has been put at 70,000,000 bushels.

PLANS are being made for the construction of a tunnel under the Hooghly river at Calcutta. The river at this point is about 36 feet deep, and according to one of the plans the tunnel will pass 12 feet beneath the bed of the river. The length of the tunnel proper will be 6,875 feet.

THE construction of the Nicaragua canal would reduce by about two-thirds the distance by water from New York to San Francisco. By the Cape Horn route the distance is 14,870 miles, by the Nicaragua route 4,946 miles; hence there would be a saving of 9,924 miles—about 26 days time.

THE construction of the trans-Alaskan military road, with which Capt. W. R. Abercrombie, commanding the Copper River exploring expedition, has been so prominently connected, is now completed through the Coast range of mountains into the Copper River valley. It is entirely free from glaciers, and is believed to be as cheap a piece of work as was ever undertaken by the War Department in opening up a new country.

A RUSSIAN author, according to *The Independent*, appears to have proved in a book recently published that Bering strait was not first discovered by Bering, who found the passage in 1728, but by Semen Deschnef, a Cossack, who was in Siberia from 1638 to 1659, and on his return to Moscow reported the existence of the strait, which he had discovered while exploring the country adjoining it on the west.

THE Tide Tables for 1900, issued by the U. S. Coast and Geodetic Survey, contain, for the first time, as a part of the annual tables, the predicted tides for St Michaels, Alaska, during the season of navigation. The times of slack current for each day of the year at Sergius narrows, Peril strait, Alaska, are also given. This is the first time full predictions of slack currents have been made and published for the localities.

AN interesting article on the subject of Liverpool and its docks appears in a recent number of the *Windsor Magazine*. The docks, the most extensive in the world, occupy the north shore of the Mersey for nearly eight miles. Their total water area is 385 acres, affording over 25 miles of wharfage. The largest dock, the Alexandra, covers upward of 33 acres. The principal graving dock is 950 feet long and is the largest in the world.

THE reports circulated in several western newspapers during the past month of the breaking up of a tornado at Hennessey, Okl., by the discharge of a cannon, has recalled to attention a "tornado breaker" patented by W. S. Blunt, C. E., several years ago. The principle of this machine rested upon the theory that an explosive discharged into the midst of an approaching tornado would immediately dissipate the cloud. The Chief of the Weather Bureau emphatically states, however, that the discharge of the most powerful cannon would be utterly inappreciable in its effect upon a tornado cloud, and that it is impossible for such clouds to be dissipated by any explosive that man may invent.

THE Coast Pilot party of the U. S. Coast and Geodetic Survey is now engaged on a revision of the Atlantic Coast Pilot, part IV, Point Judith to New York. The field work, which included all of Long Island sound, was executed in August of this year. It is hoped to have the published volume ready for distribution within two months. There was also prepared and published during the past month a supplement to the last edition of part II, which was published in 1893.

FOR the excellent map of the scene of the military operations in South Africa, which accompanies the current number, THE NATIONAL GEOGRAPHIC MAGAZINE is indebted to Major W. A. Simpson, U. S. A., Chief of the Military Information Division of the War Department. The map shows in detail the military roads, mountain passes, and other features necessary to a clear understanding of the country in which the present military operations are taking place. It is the only map of its kind on such a scale that has been published in this country, and its official character is a guarantee of its correctness.

THE attention of the people of Great Britain has on various occasions been called to the fact that the exhaustion of those wonderful beds of coal which have constituted so important a factor in the industrial supremacy of that country is not so remote an event as to justify the complacency with which it is commonly regarded. Such warnings, however, have usually excited nothing but ridicule. It will be interesting, therefore, to note the effect upon the public mind of a recently published report from one of the official inspectors of mines, in which it is stated that within fifty years, which is but a short time in the life of a nation, scarcity will begin to be felt.

THE Russian canal which is now being built from the Baltic to the Black sea, with the expectation of being completed within four years, will be 1,080 miles long. Its width of 217 feet at the top and 117 feet at the bottom and its depth of 28½ feet will permit the largest warship to pass through. Six days will be necessary for a vessel's passage, steaming at the rate of six knots day and night. The whole course is to be lighted by electricity. The total cost is estimated at $116,796,000. The gigantic extent of the work can be partially comprehended when it is remembered that the Suez canal is 92 miles long, while the proposed Nicaragua course is 169.4 miles from ocean to ocean and would require 44 hours for its transit.

THE U. S. Coast and Geodetic Survey steamer *Pathfinder*, Capt. F. Walley Perkins commanding, which left Norfolk June 17 for San Francisco *via* the Straits of Magellan, arrived there September 17. The voyage was made under favorable conditions, the time (three months between the terminal points) being remarkably short. Stops for several days were made at Santa Lucia (June 25), Pernambuco (July 6), Rio Janeiro (July 19), Montevideo (July 27), Valparaiso (August 20), Callao (August 26), and San Diego (September 14). After a short stay at San Francisco the vessel will probably go to Hawaii to engage in hydrographic work. The harbor of Hilo will probably be taken up first, and afterwards an examination will be made of a region between Honolulu and Moanalua.

WRITING in the *Pall Mall Magazine*, Arminius Vambery concurs in the general expectation of a large increase in the population of Siberia within the next hundred years as a result of the facilities that will be offered by the Russian government for the exploitation of its enormous wealth in timber, minerals, and arable land. M. Vambery, however, does not look for so large an increase—sixty or eighty millions—as is predicted by many Russian writers. While admitting the migratory propensities of the Russian peasant, he calls attention to the fact that even in the most fertile districts of southwestern European Russia the density of population is far below that of other European countries.

AMONG the many interesting facts brought out by the U. S. Coast and Geodetic Survey parties operating in Alaska are several relating to tidal phenomena. Observations in the Copper River delta by Assistant Ritter show that the tidal curve as registered on the gauge is of a peculiar type, for while the upper portion remains normal the lower part is very nearly a straight line. A possible explanation of the phenomena may be that a great ledge prevents the water from falling below a certain level. The tidal work in western Alaska by Assistant Pratt shows a rapid transition from an almost strictly diurnal tide at St Michaels to a well-marked semi-diurnal type at the Kusilvak entrance to the Yukon.

Commercial Africa in 1899 is the title of a recent report issued by O. P. Austin, Chief of the Bureau of Statistics of the Treasury Department. The report is a summary of the physical and ethnical features of the railroads and mining interests, etc., of different sections of British Africa, German Africa, Italian Africa, Abyssinia, the Boer Republics, and of every state of the continent. An excellent chart of Africa (14 by 18 inches) accompanies the report. There are also diagrams showing the languages as well as the religions of the different sections of the continent. The report is an exceedingly valuable and interesting one and should be in the hands of every one interested in the commercial progress of Africa.

AT a meeting of the Board of Managers of the National Geographic Society, November 1, 1899, the following resolutions were passed:

Resolved, That the Board of Managers of the National Geographic Society, having learned with profound regret of the death of the Hon. Charles P. Daly, LL.D., president of the American Geographical Society, place on record its high appreciation of the distinguished services to geographic science rendered by Judge Daly during his long and honorable career, and tender to the officers and members of the American Geographical Society its respectful sympathy with them in their loss.

Resolved, That a copy of these resolutions, signed by the President and the Secretary, be transmitted to the American Geographical Society.

ONE of the most interesting features of railroad travel in the mountain regions of the Far West has hitherto been the steep grades by which the various lines have, with one or two notable exceptions, been made to reach the high elevations at which they have been carried over the different ranges. These, however, are rapidly being done away with, in some cases by the construction of tunnels, in others by the building of new lines over passes of lower altitude. The famous Veta Pass line of the Denver and Rio Grande, with a maximum grade of 4.7 per cent, or

248 feet per mile, will soon be a thing of the past, a new route, with a maximum grade of only 3 per cent, being in course of construction eight miles south of the existing line.

HYDROGRAPHIC investigations have been extended by the Nicaragua Canal Commission to the Isthmus of Panama, the work being still under the charge of Mr Arthur P. Davis, of the Division of Hydrography, U. S. Geological Survey. The Panama Company has been maintaining on Chagres river three elaborate nilometers or automatic devices for recording the height of water. Two of these records have been kept for a number of years. A third was established in April, 1899, at Alajuela. It is somewhat extraordinary that hitherto no observations of rainfall have been maintained above these river stations and no measurements made of the Rio Grande, the stream on the Pacific slope. Arrangements have been made for obtaining a record of rainfall and for measuring this stream, every facility being afforded by the French company.

THE article on "The Relation of Forests and Forest Fires," by Mr Gifford Pinchot, Forester of the U. S. Department of Agriculture, which appeared in the October number of this Magazine, is receiving much favorable comment from students of forestry. A feature of the article is the excellent set of original pictures with which Mr Pinchot has illustrated his text. It is regrettable that, through an error for which Mr Pinchot was not responsible, several mistakes should have crept into the titles. The photograph on page 400, showing most clearly two generations of lodgepole pine, was taken by Prof. C. S. Crandall, of Fort Collins, Colo., a collaborator in the Division of Forestry, and should have been credited to him. Four feet beneath the large cedar tree standing in the background on the right of the cut on page 402, a layer of charcoal was found—a proof that the tree had grown up after a fire. The title of the picture of a seedling longleaf pine on page 399 is misleading, for while the drooping needles still retain their natural downward curve, the young tree is too far advanced for them any longer to afford protection to the lower stem in case of fire.

IN a recent communication to the Department of State (see Consular Reports, vol. lxi, No. 230, p. 487) the U. S. consul at Stratford, Ontario, expresses the opinion that the most serious problem that confronts the Canadian people of the future is material for fuel. He states that the gigantic lumber industries and the great annual forest fires have so denuded the timber area of Ontario that the people are thoroughly alarmed about the future fuel supply. So long and severe are the winters that an ordinary residence will consume $100 worth of fuel in a year. It has been well known for years that there were extensive beds of peat bogs in Canada, and particularly in the Province of Ontario, and an effort has been made during the past six months to utilize this product of nature. It has been tested in locomotives with excellent results, 100 pounds of peat having been found to be equal to 95.15 pounds of coal. The heat produced is much greater than that of coal, but it is 8 per cent deficient in lasting power. The recent invention of machinery, by means of which vast areas of hitherto unused bogs can be converted into marketable peat, has opened up a new Canadian industry.

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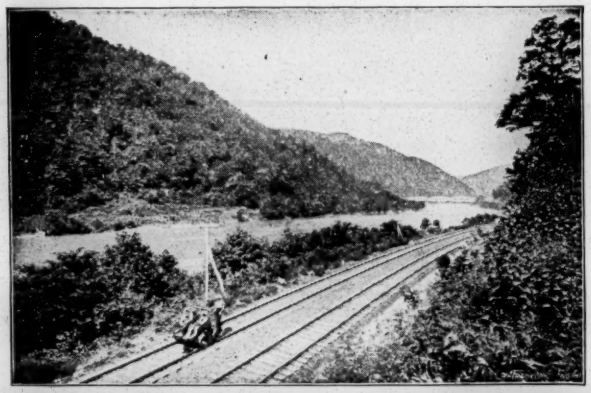

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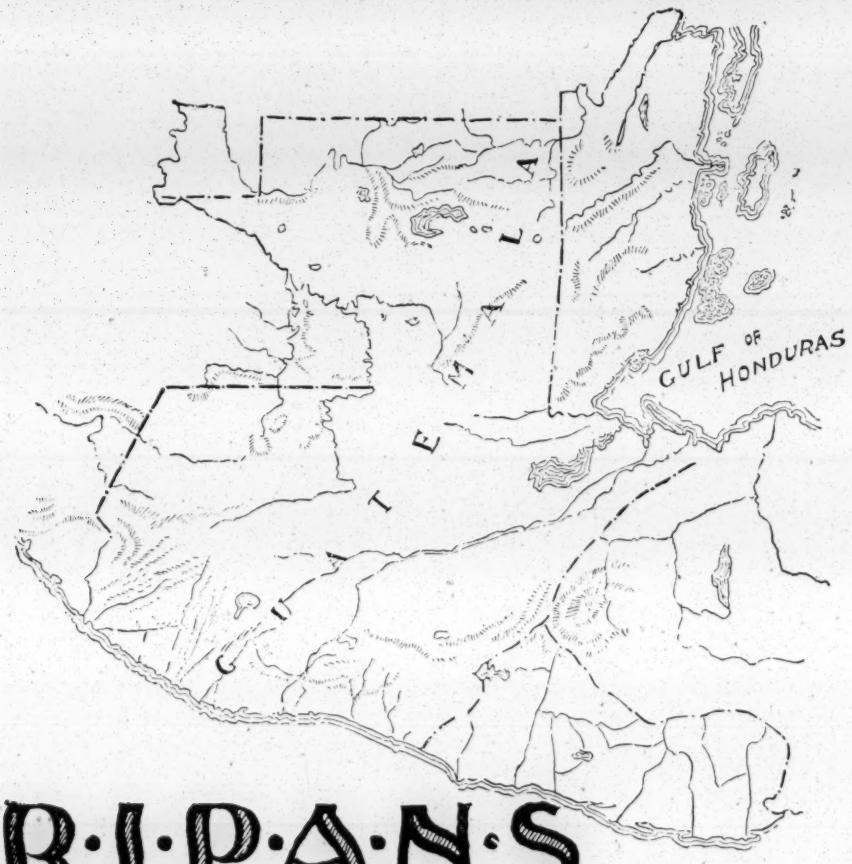

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ERRATA

Page 60, lines 19 and 30, for Manilla read Manila.

Page 159, line 31, for Chili read Chile.

Page 184, line 15, for Congo read Kongo.

Page 250, line 39, and page 251, line 4, for Torro read Toro.

Page 238, line 38; page 240, line 7, and page 242 (map), for Guiscoyol read Guiscoyal.

Page 251, line 20; page 252, line 2; page 258, line 36; page 262, line 23, and page 265, last line, for Serapiqui read Sarapiqui.

Map facing page 233, for Mombucho read Mombacho, for Zapatera read Zapatero.

THE

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